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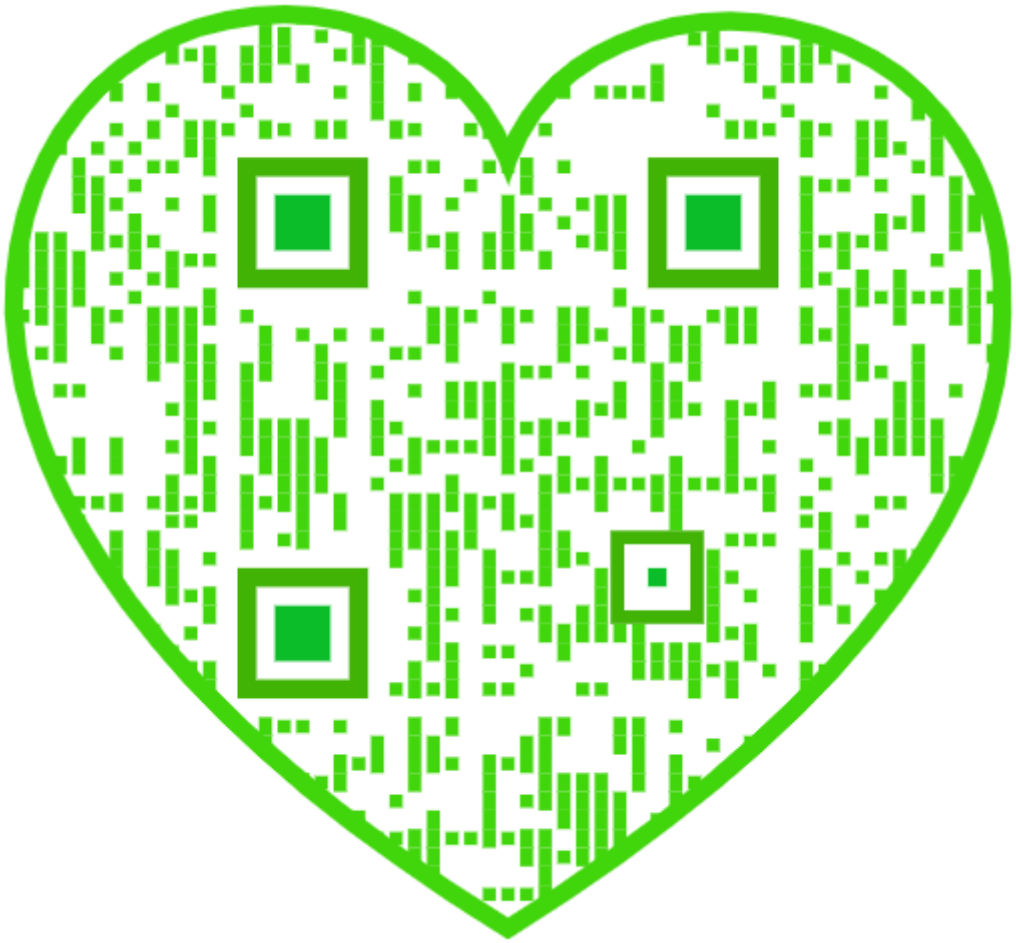

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LATE PROFESSOR OF OBSTETRICS AND DISEASES OF WOMEN IN STARLING MEDICAL COLLEGE

REVISED AND EDITED BY

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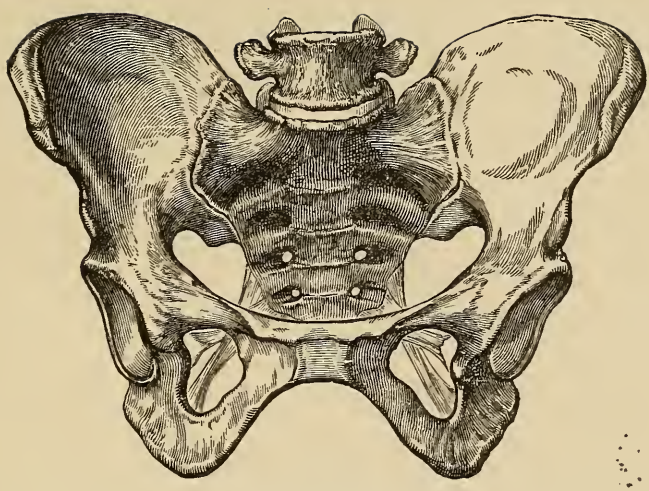

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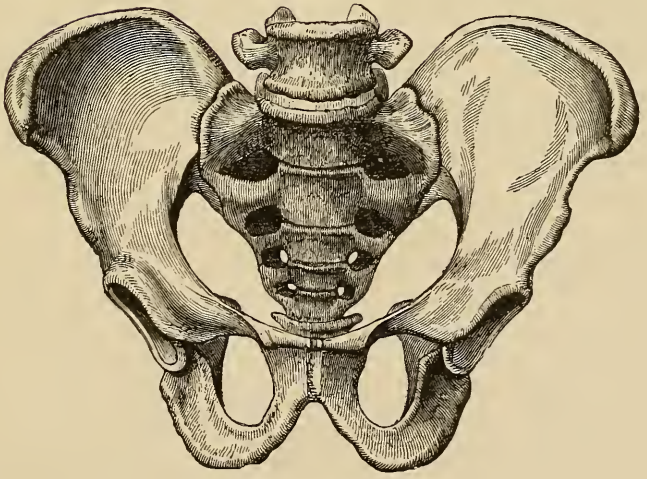

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PREFACE TO THE NINTH EDITION.

In this ninth edition of Landis Compend the editor has made a number of changes, both in the arrangement of the book and in the addition of considerable new material. Additions have been made in the more detailed anatomy of the female genital organs and in the diagnosis of pregnancy. The operation of vaginal Cæsarean section has been described, as well as several of the minor operative procedures in pregnant and parturient women.

1135 Spruce St. William H. Wells, M.D.

PREFACE TO FIRST EDITION.

The design of this book is to furnish a useful compend and Quiz-book for the student, and also, by the system of question and answer, to bring out the more important facts in Obstetrics more clearly than can be done in the method of continuous composition. On many points it is difficult to determine what is the "received doctrine," except by the mere numerical weight of authorities. The author has, therefore, attempted to maintain a judicious eclecticism, instead of undertaking the task, impracticable within the limits of the book, of recording all the various and more or less received teachings of all authors.

H. G. L.

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COMPEND

OF

OBSTETRICS

INTRODUCTION

What is Obstetrics?

The science and art of affording aid to women in pregnancy, childbirth, and the puerperal state.

What are the synonyms for obstetrics?

Midwifery, accouchement, maieutics, tocology.

What is meant by science and art?

The *science* of Obstetrics embraces the definite rules of procedure founded upon a correct knowledge of the anatomy and physiology of pregnancy, labor, and the puerperal state, and of their complications; the *art* consists in the skilful carrying out of these rules. The science may be taught in books and lectures; the art must be acquired by practice at the bedside.

How may the subject be divided?

1st. The Anatomy of the parts concerned in labor, viz.: the reproductive organs and their surroundings.

2d. The Physiology of these parts.

3d. Their Pathology, including all deviations from the natural course of pregnancy, labor and the puerperal period.

4th. The treatment of natural and complicated and the pathological conditions of pregnancy, labor and the puerperal period.

What are the reproductive organs of woman?

1st. Internal, viz.: the ovaries, oviducts, uterus, and vagina.

2d. External, viz.: the mons veneris; labia majora and minora; clitoris; vestibule and fossa navicularis; hymen, or carunculæ myrtiformes; fourchette and perineum; and also the breasts, or mammary glands.

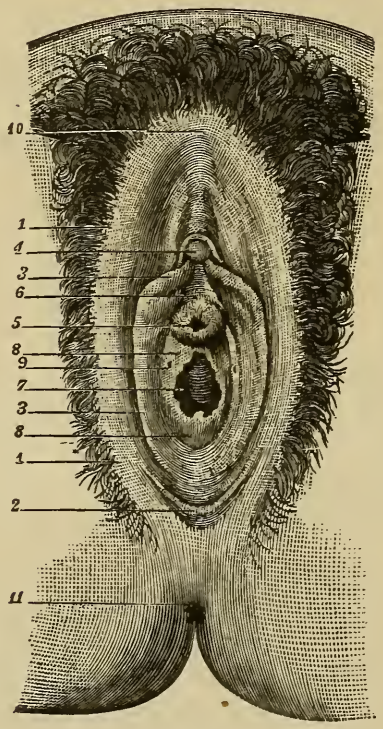

FIG. 1.—VULVA OF A VIRGIN.

1. Labia majora of right side. 2. Fourchette. 3. Labia minora. 4. Clitoris. 5. Urethral orifice. 6. Vestibule. 7. Orifice of the vagina. 8. Hymen. 9. Orifice of vulvo-vaginal gland. 10. Anterior commissure of the labia majora. 11. Orifice of the anus.

Where are they situated?

With the exception of the breasts and mons veneris, they are placed within the *Pelvis*, or below it, between the thighs. The mons veneris is placed directly upon the symphysis pubis, and the breasts on the pectoralis major muscle of either side, from the 3d to the 7th rib.

THE PELVIS

What is the Pelvis?

A bony structure, placed at the inferior extremity of the vertebral column, which it supports above, while it rests on the femora below. It is divided into the true and false pelvis.

Why is it called the pelvis?

Because, when clothed with muscles, ligaments, and fasciæ, it resembles a *basin*.

Of how many bones is the obstetrical pelvis composed?

Five: the last lumbar vertebra, sacrum, coccyx, and two ossa innominata.

What is the sacrum?

A wedge-shaped bone, apparently formed by the fusion of five vertebræ. It is curved, being concave in front.

How many articular surfaces does it present?

Six: by three it is connected with the last lumbar vertebra above; by one on each side, with the ossa innominata, and by one below, with the coccyx.

What is the coccyx?

A small and similarly wedge-shaped bone, apparently formed by the fusion of three or four vertebral bodies. It has one articular surface above, by which it is connected with the sacrum. It tapers from that bone, and is supposed to be the remains of the caudal vertebræ of animals.

What are the ossa innominata?

The haunch bones, of irregular shape, articulating internally with the sacrum behind and with each other in front. Each os innominatum is composed of three separate pieces, the *ilium*, *ischium*, and *pubes*. Their point of juncture is found in a cup-shaped depression on the outside of the bone, called the *acetabulum*.

When do the several parts of the os innominatum unite?

By the the twenty-fifth year.

What uses has the pelvis?

1st. To support and transmit the weight of the body.
2d. To contain and protect certain organs.

3d. To serve as a parturient tube or canal, through which the child may be definitely guided during labor.

To what parts is the weight of the body transmitted?

To the femora in the erect posture, and to the tuberosities of the ischia in the sitting posture.

How is the weight of the body transmitted to the femora?

By two beams of bone, consisting of the upper part of the sacrum and body of the ilium on either side.

What are these beams called?

The sacro-iliac beams (see Fig. 2).

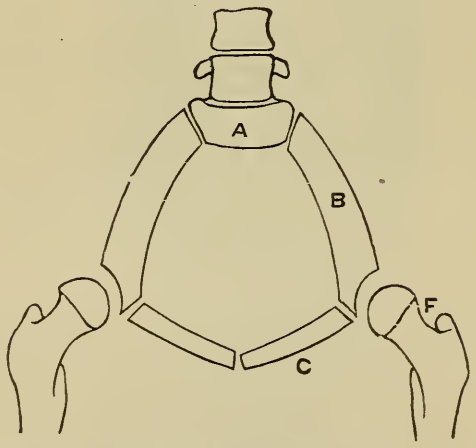

FIG. 2.—B, with half of A = the left sacro-iliac beam, transmitting weight to the femur F. C = the body of pubes, constituting with its fellow the pubic beam.

What prevents these beams from being pushed in and out at their distal ends?

Another beam is placed between them, extending from one acetabulum to the opposite one, consisting of the upper part of the pubes on either side.

What is this beam called?

The pubic beam (see Fig. 2).

Why are these beams not straight?

They are arched outwardly to make more room in the pelvis, to enable it to fulfil its second and third uses.

How is the diminution in strength of the sacro-iliac beams, caused by this arching, remedied?

By buttressing the beams by that expansion of the sacrum and iliac bones called the *wings* of the ilia and sacrum (Fig. 4).

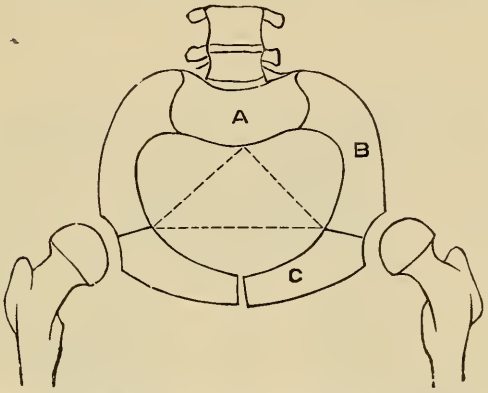

FIG. 3.—The same as in Fig. 2, but with the beams arched; the dotted lines show the original direction of force.

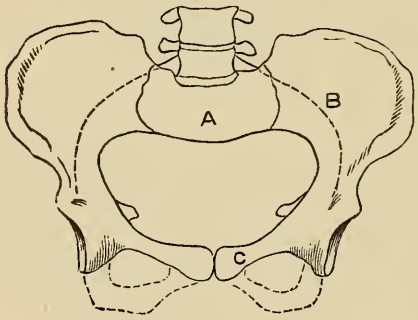

FIG. 4.—The same as in Fig. 3, with the arches strengthened by the addition of the iliac wings, etc. The dotted lines below show the sub-pubic arch in front and the beginning of the ilio-ischiatic beams.

How are jarring and concussion prevented?

By placing joints at the center of each beam.

How is the diminution of strength caused by these joints remedied?

By covering them with powerful ligaments.

How is weight transmitted from the vertebral column to the tuberosities of the ischia?

By two beams of bone, placed directly under the sacro-iliac beams, consisting of the ischium and under portion of the ilium on either side.

What are they called?
The ilio-ischiatic beams.

How are they held together in front?
By another arched beam, placed directly under the public beam, and called the *sub-pubic* beam.

What is the great sacro-sciatic notch?
The arched space under the ilio-ischiatic beam.

What bony projection is found in it?
The spine of the ischium.

What is the lesser sacro-sciatic notch?
The part of the arch below the spine of the ischium.

What is the obturator foramen?
The space between the pubic and sub-pubic beams on either side.

How is it closed?
By a membrane which gives attachment to muscles.

How may the female pelvis be distinguished from the male?
In the female, the sub-pubic beam is more roundly arched and its edges more everted; the transverse diameters are relatively greater, and the antero-posterior diameters relatively less; the transverse diameter of the inlet crosses the antero-posterior at a point in front of the intersection of the oblique diameters, and the ischial spines are to the outer side of plumb lines dropped from the posterior superior iliac spines. (Some female pelves, especially among the lower races, approach the male type.) See Fig. 5.

What joints exist in the pelvis?
Three lumbo-sacral above (one between the bodies and two between the articular processes), two sacro-iliac (one on either side), the pubic joint, in front, and the sacro-coccygeal joint, behind.

What are the pelvic joints called?
Symphyses, and the pubic joint is often called, by way of distinction, *the* symphysis.

What kind of joints are they?
Amphiarthrodial, with the exception of those formed by the articular processes of the sacrum and last lumbar vertebra, which are

arthrodial, and are lined by synovial membranes. The sacro-coccygeal joint is always freely movable, and has a demonstrable synovial sac; the other joints can only be shown to have sacs during pregnancy.

What is the sacral promontory?

The projection or angle formed by the top of the sacrum in front at its junction with the vertebra above. It is often called simply the promontory.

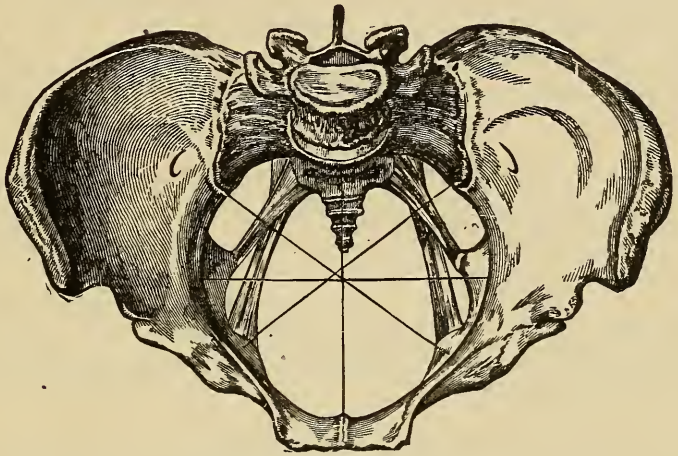

FIG. 5.

What is the ilio-pectineal line?

A bony ridge or raised line, which, beginning at the promontory, extends around each side of the pelvis, within, until it meets the opposite line at the symphysis pubis.

What are the synonyms for the ilio-pectineal line?

The superior strait, the pelvic inlet, margin, brim, isthmus, linea terminale, linea ilio-pectinea, the pelvic inlet.

What is meant by the anatomical inlet?

This is the entrance of the small or true pelvis and corresponds to the upper margin of the symphysis pubis and to the edges of the bones extending backward to the sacral promontory.

What is the obstetric inlet?

This is the least available space at the upper position of the pelvic canal; it is bounded by a line passing about 1 inch below the upper

margin of the symphysis pubis; along the posterior margin of the oblique rami and body of the pubis, past the ilio-pectineal eminences, the anterior margin of the sacral alæ, and the summit of the sacral promontory. (Edgar.)

What anatomical landmarks are found on the pelvic inlet?

1. The symphysis pubis in front.
2. Posterior on either side of the pubic bone, close to the ilio-pubic junction—the ilio-pectineal eminence on either side.
3. Ilio-pectineal line.
4. Sacro-iliac joints.
5. The intra-vertebral cartilage between the last lumbar vertebra and the sacrum.

What is the shape of the pelvic inlet?

The shape of the inlet of the bony pubis is that of a curvilinear triangle with the base behind and the apex in front, the chief irregularity being at the sacral promontory.

What is the ilio-pectineal line said to bound?

The *inlet* of the pelvis, because the child must first enter the pelvis through this bony ring.

What parts lie above the ilio-pectineal line?

The wings of the sarcum, iliac fossæ, and crests, and the last lumbar vertebra forming the bony parts, or the *false pelvis.*

What are the boundaries of the false pelvis?

The false pelvis, also known as the superior or large pelvis is bounded behind by the last lumbar vertebra and the ilio-lumbar ligaments. On the sides by the iliac bones. In front there are no bones but this space is filled in the living subject by the elastic lower abdominal wall, below it bounded by the superior strait. The outward curve of the iliac bones is known as the flare of the pelvis. If the convergence of the bony walls of the false pelvis were continued downward, they would meet at a point corresponding with the fourth sacral vertebra.

What lies below it?

The true or obstetric pelvis.

What are the boundaries of the true pelvis or pelvic cavity?

The true pelvis also known as the inferior or small pelvis is bounded above by the superior strait, posteriorly by the concavity of the sacrum

and coccyx, on the sides by the sacro-iliac ligaments, the innominate bones, the internal surfaces of the acetabula and obturator membranes, anteriorly by the pubic bones and the obturator membranes, inferiorly it is bounded by the pelvic outlet. If any horizontal plane of this curved cylinder of the true pelvis is taken at a level, the bony wall is incomplete. In any plane selected there may be a foramen covered by membrane or by distensible and elastic muscular or fibrous tissue or a movable joint such as the coccyx directly opposite the solid mass of the pubic bones; or some elastic tissue that will permit of considerable compression without injury. This arrangement is to prevent too great or prolonged pressure on the fetus during birth.

What is the pectineal eminence?

The point in the ilio-pectineal line which is opposite the acetabulum, and is slightly raised above the ordinary level of the line.

What is the ilio-ischiatic line?

A slightly raised ridge, on the inside of the pelvis, which begins at the pectineal eminence and ends in the ischiatic spine on either side.

What are the cardinal points of Capuron?

The sacro-iliac joints and ilio-pectineal eminences.

What are the diameters of the pelvis?

Lines drawn from various points of the pelvic inlet, pelvic cavity and outlet to facilitate the description of the relations which the child's surface bears to the pelvis during its passage through it.

What are the diameters of the inlet?

The antero-posterior or conjugate, two oblique, and the transverse.

What is the conjugate (or sacro-suprapubic) diameter of the inlet?

A line drawn from the promontory of the sacrum to the top of the symphysis pubis. It is about 4 1/2 inches, or 11.5 centimeters. The sacro-pubic diameter or true conjugate is taken from the promontory of the sacrum to the middle of the posterior surface of the pubic joint. Its measurement is about the same as the above. The sacro-sub-pubic diameter is taken from the same point behind to the inferior surface of the pubic joint. Its length is 13.5 centimeters, or 5.3 inches.

What are the oblique diameters?

Lines drawn from the sacro-iliac symphysis of either side to a point in front of the pectineal eminence of the opposite side (Meadows). The one drawn from the right sacro-iliac symphysis is called the right oblique; the one from the left symphysis, the left oblique. They are about 5.3 inches, or 13.5 centimeters.

What is the transverse diameter of the inlet?

A line drawn directly across the pelvic inlet from one pectineal eminence to the other. In the normal pelvis it is about 4.8 inches or 12.5 centimeters.

What is the circumference of the pelvic inlet?

About 15.8 inches, or 40 centimeters.

What is the depth of the pelvic cavity?

One and one-half inches, or 3.8 centimeters in front; 3 1/2 inches, or 8.9 centimeters at sides; posteriorly, 4 1/4 inches, or 10.8 centimeters, or following the curve of the sacrum, it is about 5 1/2 inches, or 13.8 centimeters. The average diameters are about 4 3/4 to 5 inches, or 12 centimeters.

What obstetric landmarks are found in the pelvic cavity or true pelvis?

1. The pubic joint in front.
2. The obturator foramen.
3. The spine of the ischium.
4. The great sacro-sciatic foramen and ligaments.
5. The lesser sacro-sciatic foramen and ligaments.
6. The sacrum and coccyx.

Where is the pelvic outlet?

It is bounded by the tip of the coccyx behind, by the tuberosities of the ischia on the sides, and by the sub-pubic arch in front. It is called also the *inferior strait.*

What are the diameters of the outlet?

The conjugate and transverse.

What is the conjugate diameter of the outlet?

A line drawn from the tip of the coccyx to the under edge of the symphysis pubis. It is of variable length, owing to the mobility of the coccyx, but when the latter is extended, during labor, it is the

longest diameter of the outlet, and may measure 5 inches, or about 15 centimeters; ordinarily it measures about 4.3 inches, or 11 centimeters.

What is the transverse diameter of the outlet?

A line drawn from one tuberosity of the ischium to the opposite one, and measures about 4 inches, or 11 centimeters in the normal pelvis. The circumference of the outlet is 18 inches or about 45 centimeters.

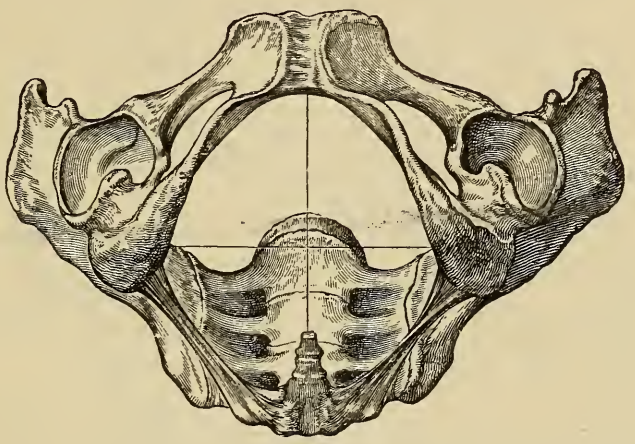

FIG. 6.

What are the obstetric landmarks on the pelvic outlet?

From before backward.

1. The pubic arch and sub-pubic ligament.
2. Descending ramus of the pubis and ascending ramus of the ischium.
3. Tuberosity of the ischium.
4. The spine of the ischium.
5. The greater and lesser sacro-sciatic ligament.
6. The coccyx.

What are the planes of the pelvis?

Imaginary levels, drawn through any part of the pelvic circumference (Playfair), to facilitate the description of the relations of the pelvis to the child, vertebral column, or horizon. They may be illustrated by pieces of card-board cut so as to fit the pelvic cavity at any level.

What planes are important?

The plane of the inlet, of the cavity and of the outlet.

What is the plane of the inlet?

A plane drawn transversely through the conjugate diameter of the inlet, and limited by the circumference of the inlet. The plane of the *obstetric* inlet would be represented by a piece of card-board that so fitting the entrance of the pelvis that its margins corresponded to the base of the sacrum, the ilio-pectorial line and the posterior surface of the symphysis pubis along a transverse line 2/3 inch (1 cm.) below its upper margin (Edgar). It does not coincide with the anatomical conjugate diameter of the anatomical inlet.

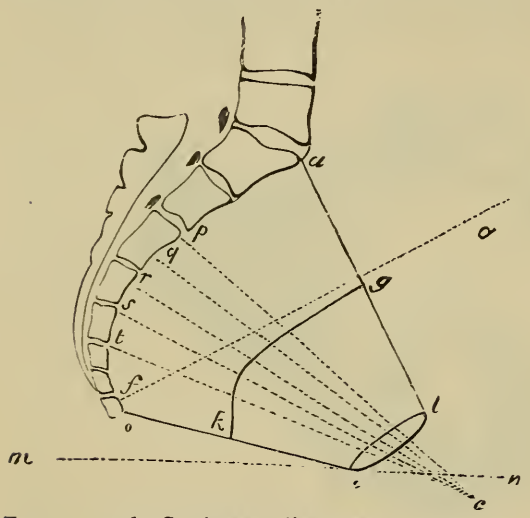

FIG. 7.—*a b.* Conjugate diameter of inlet. *e f.* Conjugate diameter of outlet. *g k.* Axis of pelvic cavity or curve of Carus.

What is the plane of the pelvic cavity?

A plane extending from the middle of the posterior surface of the the symphysis pubis, over the central point of the internal surfaces of the acetabular cavities, to the upper margin of the third piece of the sacrum.

What is the plane of the outlet?

A plane drawn transversely through the conjugate diameter of the outlet, and limited by the circumference of the outlet.

How are these planes used to show the position of the pelvis in different postures?

In the erect posture the plane of the inlet makes an angle of 60° with the horizon. In the semi-recumbent posture the same plane is directly horizontal, and in the recumbent posture it forms a reversed angle of 45° with the horizon. The plane of the parturient outlet is below the plane of the bony outlet and corresponds with the vulvo-vaginal ring. It is nearly parallel with the long axis of the mother's

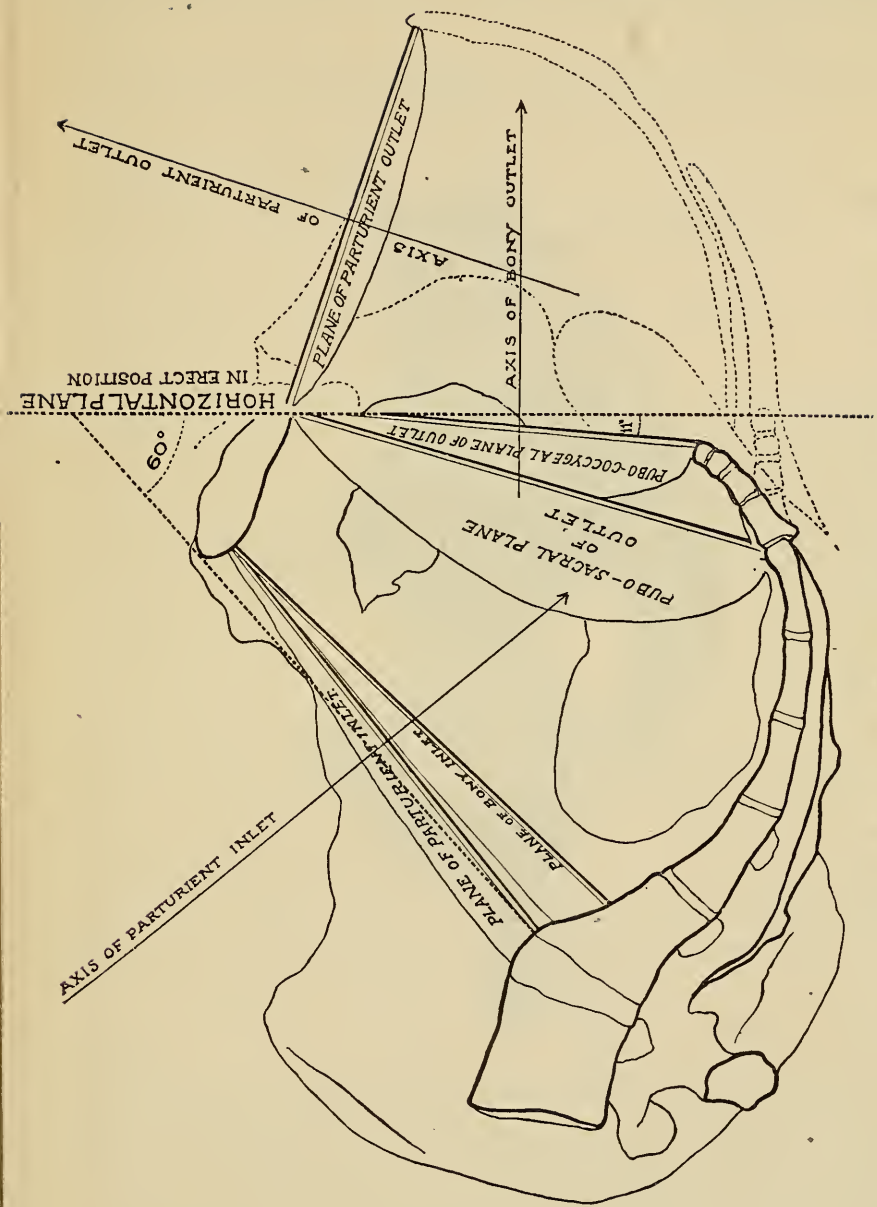

FIG. 8.—PLANES OF THE BONY PELVIS AND PARTURENT TRACT, AND AXES OF THE PARTURIENT INLET AND OF THE BONY AND PARTURIENT OUTLETS.—(*Edgar.*)

body and when the woman is in the dorsal position looks almost directly upward.

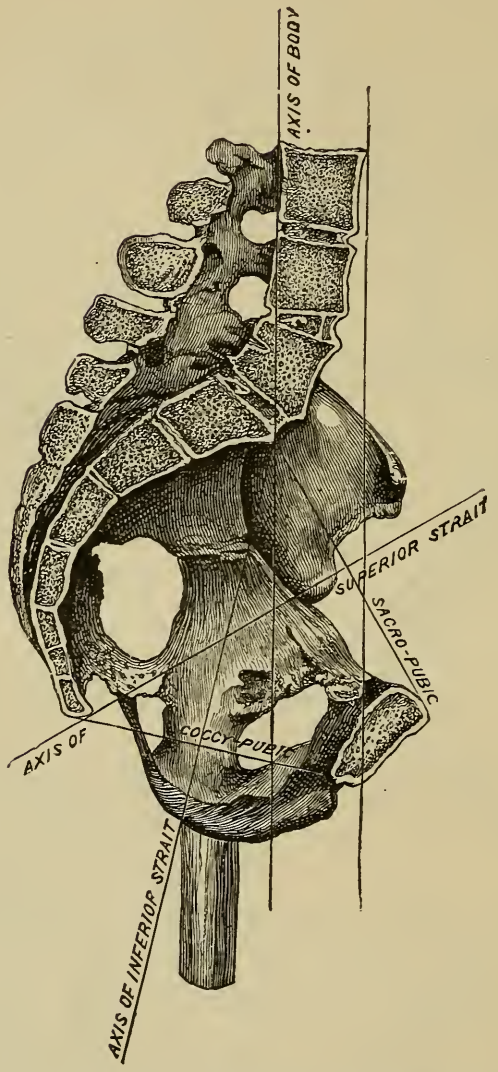

FIG. 9.—AXES OF THE PELVIS IN RELATION TO THE PERPENDICULAR OF THE BODY.

What is the axis of the pelvis?

As usually given it is a line drawn from the center of the conjugate diameter of the inlet, parallel to the face of the sacrum and

coccyx, to the center of the conjugate diameter of the outlet (Figs. 7, 8, 9).

What other name is sometimes given to the axis of the pelvis?

The curve or circle of Carus (see *g k*, Fig. 7).

What is the obliquity of the pelvis?

The planes of the pelvis and the spinal column stand in the relation of an obtuse angle; this is the obliquity of the pelvis.

How is the pelvis lined within?

By certain muscles, blood-vessels, nerves, and fasciæ.

What muscles are contained in it?

1. The *Psoas iliacus* muscle on either side, consists, first, of the iliacus internus, which, in its origin, covers almost the entire inner aspect of the wing of the ilium, uniting with the psoas magnus, which passes over the upper border of the sacrum. Their conjoined body passes along the border of the sacro-iliac arch, and by common tendon passes out of the pelvis, between the anterior inferior iliac spine and the ilio-pectineal eminence, to be inserted upon the femur.
2. The *Pyriformis* muscle on either side, which covers with its insertion the face of the sacrum, and passes out of the pelvis under the sacro-ischiatic arch, to be inserted upon the femur.
3. The *Obturator internus* muscle on either side, which covers the anterior pelvic walls and passes out under the sacro-ischiatic arch.

What obstetric uses have these muscles?

Besides serving as a soft lining to the bones, the psoas iliacus furnishes a cushion, or guard, for the iliac vessels and nerves, preserving them from pressure, while the pyriformis performs the same office for the sciatic nerve, which lies along its border.

What modifications are produced in the bony pelvis by the soft parts?

They lessen the pelvic diameters and the depth of the iliac fossæ. The obliquity of the iliac bones is also decreased on their inner surface.

How are the diameters of the pelvis modified by the soft parts?

The transverse diameter of the inlet is decreased from one-half to three-quarters of an inch by the ilio-psoas muscles; both oblique diameters are lessened one-eighth of an inch, while the left oblique

is still further decreased by the rectum. The iliacus muscles lessen the depth of the iliac fossæ, while the obliquity of the ilia is made less by the psoas muscles.

THE REPRODUCTIVE ORGANS

THE INTERNAL ORGANS

From what are the internal reproductive organs developed?

From the Wolffian bodies, which are two glandular bodies existing

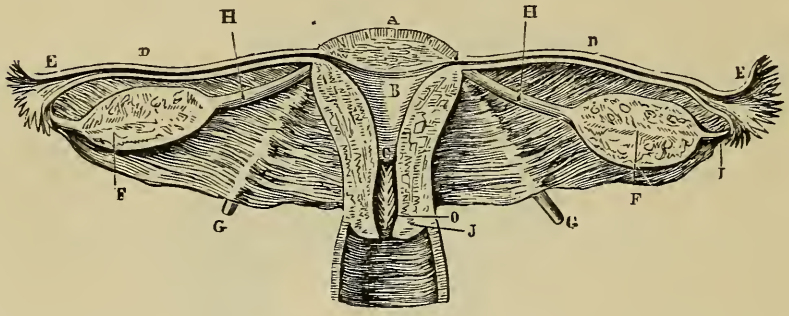

FIG. 10.—A. Fundus. B. Cavity of uterus. C. Internal os. D. Fallopian tubes or oviducts. E. Fimbriated extremity. F. Ovary. C. Round ligament. H. Ligament of ovary. I. Tubo-ovarian ligament. J. External os. O. Cavity of cervix, showing rugæ. V. Vagina. *b*. Mouths of oviducts.

one on either side of the spinal column during embryonic life. The Wolffian bodies are also known as the false, primitive, or primordial kidneys or the kidney of Oken.

Of what do the Wolffian bodies consist?

Each is composed of a series of fine tubes emptying into a common excretory duct known as the Wolffian duct.

What are Müller's ducts?

These are two in number, one for each Wolffian body being developed on their outer surface. From them are derived the oviducts, uterus, and vagina.

What and where is the Uterus?

The uterus or womb is a hollow muscular organ, situated in the center of the pelvis, between the bladder and the rectum.

What are its shape and dimensions?

It somewhat resembles a pear, the anterior surface being flat, while the posterior surface is rounded. In the unimpregnated state it is about 3 inches long, 2 inches broad at the broadest part of the body or corpus and at the same point about 1 inch thick antero-posteriorly. Its weight in the virgin is approximately 1 ounce.

Into what parts is it divided?

Into, first, the cervix, or neck, about an inch long; and second, the body or fundus.

What are the cornua of the uterus?

The upper and outer angles are called the cornua.

How is the cavity of the uterus divided?

Into the cavities of the cervix and body. The first is fusiform, and appears to be an ante-chamber to the main cavity; the latter is triangular in outline, but with its walls in apposition (see Fig. 11).

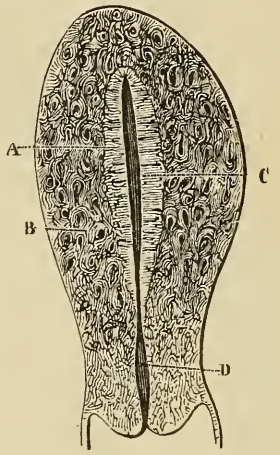

FIG. 11.—ANTERO-POSTERIOR SECTION OF ADULT UTERUS.

What openings are found in the cervix?

The os externum, external os, or os uteri, called also *the* os (J, Fig. 10), is a small opening into the cavity of the cervix at its lower end. The constriction between the cavities of the neck and body is called the os internum or internal os (C, Fig. 10).

What is the contraction ring of Bandl?

This is a line of depression sometimes felt on digital pressure just above the pubes. It corresponds to the site of the internal os and can only be felt during labor pains (see Fig. 12).

What is the structure of the uterus?

It is mainly composed of muscular tissue, for the most part of the unstriped variety, with fibrous connective tissue, blood-vessels, and nerves. On the outside, it is nearly covered with peritoneum, and on the inside, is lined with mucous membrane, called the endometrium.

How are the muscular fibers arranged?

For the most part they are irregularly and inextricably interlaced and surround the large blood-vessels which penetrate between them,

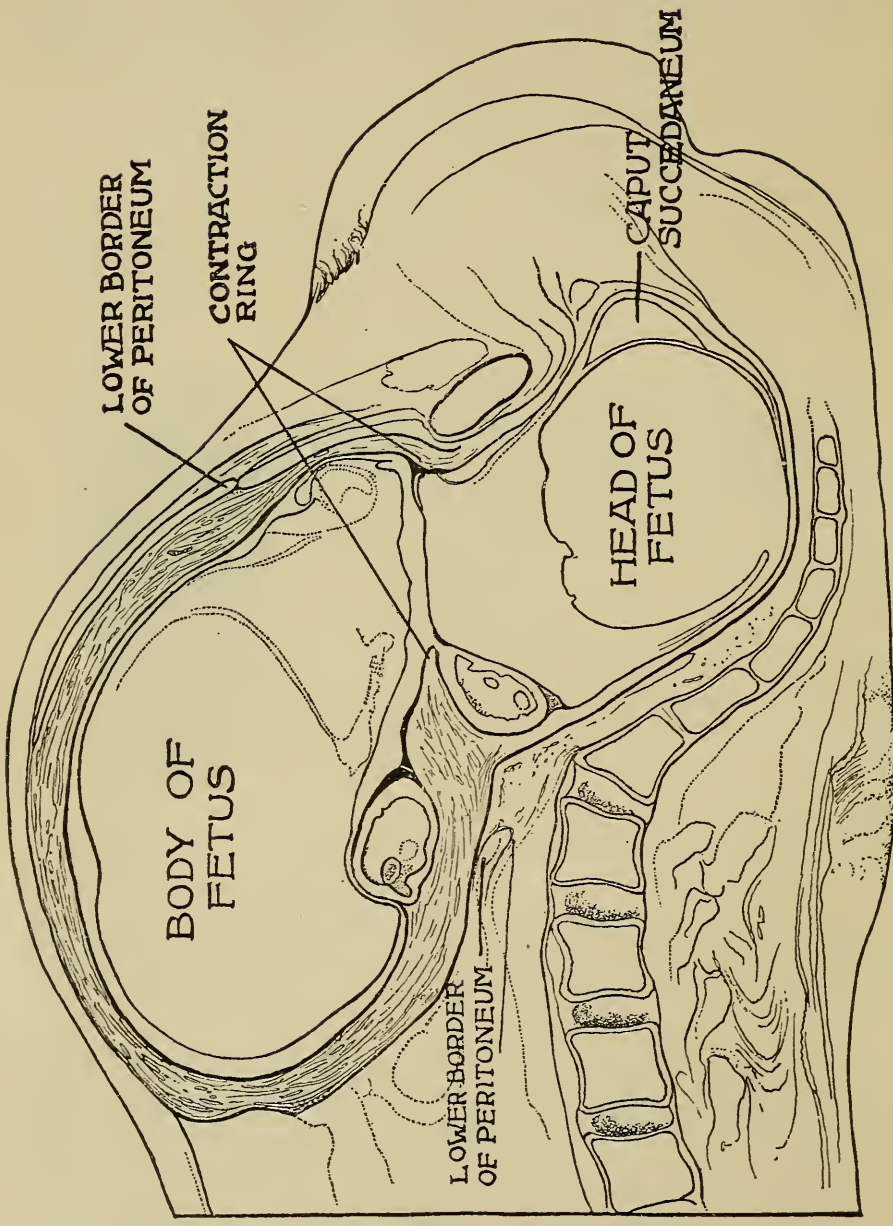

FIG. 12.—SHOWING THE CANALIZATION OF THE BIRTH CANAL AND THE CONTRACTION RING OF BANDL.—(*Edgar.*)

but a circular arrangement of fibers is found in the cervix, and to a certain extent around the openings of the Fallopian tubes, while in the body the majority are longitudinal. The longitudinal fibers aid greatly in dilating the cervix and retracting it over the presenting part of the fetus. A middle layer of oblique fibers is also described; these latter aid materially in the expulsive power of the organ.

What is the blood supply of the uterus?

The arterial supply is prinicpally from the uterine and to a lesser extent from the ovarian arteries. The uterine artery is the main branch of the hypogastric, which, descending a short distance from its origin enters the base of the broad ligament, *crosses the ureter* and makes its way to the side of the uterus. Just before reaching the supravaginal portion of the cervix it divides into a larger and a smaller branch—the smaller—the cervico-vaginal artery supplying the lower portion of the cervix and the upper portion of the vagina. The main branch turns abruptly upward and extends as a very convuluted vessel along the upper margin of the uterus giving off a branch of considerable size to the upper portion of the cervix and numerous smaller ones which penetrate the body of the uterus. Just before reaching the tube it divides into three terminal branches—the *fundal, tubal* and *ovarian*—the last of which anastomoses with the *terminal branch* of the *ovarian artery;* the second making its way through the mesosalpinx, supplies the tube and the fundal branch is distributed to the upper portion of the uterus. The *ovarian* or *internal spermatic* artery is a branch of the aorta and enters the broad ligament through the infundibulo pelvic ligament. On reaching the hilum of the ovary it breaks up into a number of small branches which enter the organ while its main stem traverses the entire length of the broad ligament and makes its way to the upper portion of the margin of the uterus, when it anastomses with the ovarian branch of the uterine artery. (Williams Obstetrics.)

Is there any connection or anastomsis between the circulation of both sides of the uterus?

The experiments of Clark have shown that when the uterine artery on one side was injected with fluid the latter escaped from the opposite uterine artery before it began to flow from the veins showing the presence of numerous arterial anastomoses in the substance of the uterus.

Describe the venous or return circulation of the uterus.

The veins from the uterus form an abundant plexus around each uterine artery and unite to form the *uterine vein* on either side, which then empties into the *hypogastric* vein. This in turn empties with the *internal* iliac. The blood from the ovary and upper part of the broad ligament is collected by a number of veins which form a large plexus within the broad ligament—the Pampiniform Plexus—the vessels from which terminate in the *ovarian vein.* The right ovarian vein empties into the vena cava while the left empties into the renal vein.

How is the uterus supplied with Nerves?

The nerve supply of the uterus is derived mainly from the sympathetic system. Although the cerebrospinal system bears a part. The latter is represented by fibers derived from the 3rd and 4th sacral nerves and Herlizka (Williams) has demonstrated the presence of medullated nerve fibers in the uterine wall, which showed free endings between the muscle bundles. According to Herff and Gawronsky ganglionic cells exist in the muscular coat also.

The greater portion of the nerve supply is derived from the sympathetic system. According to Frankenhaeuser, Lee, Rein and Pessemski large nerve trunks from the inner iliac plexus pass down on either side of the rectum, and following the course of the utero-sacral ligaments terminate in the large cervical ganglion. Keiffer has shown that small but definite ganglia are present in the course of the nerves, especially where various branches cross one another.

How is the uterus supplied with Lymphatics?

The endometrium is abundantly supplied with lymph spaces but possesses no lymphatic vessels. (Leopold, Poirrier, etc., quoted from Williams.) Immediately beneath it in the muscular coat a few lymphatics may be found which become better defined as the peritoneum is approached and form an abundant lymphatic plexus just beneath it, which is especially marked on the posterior or intestinal wall of the uterus. The lymphatics from the various portions of the uterus are connected with several sets of glands.

1. Those from the cervix terminating in the hypogastric glands which are situated in the spaces between the external iliac and hypogastric arteries.
2. The lymphatics from the body of the uterus are distributed to two groups of glands—one set making their way to the hypogastric glands, while another set after joining certain lymphatics

for the ovarian region terminate in the lumbar glands which are situated in front of the aorta at about the level of the lower portion of the kidneys.

What kind of mucous membrane lines the uterus?

The membrane lining the body is pinkish in color, quite thick and vascular, and is composed:

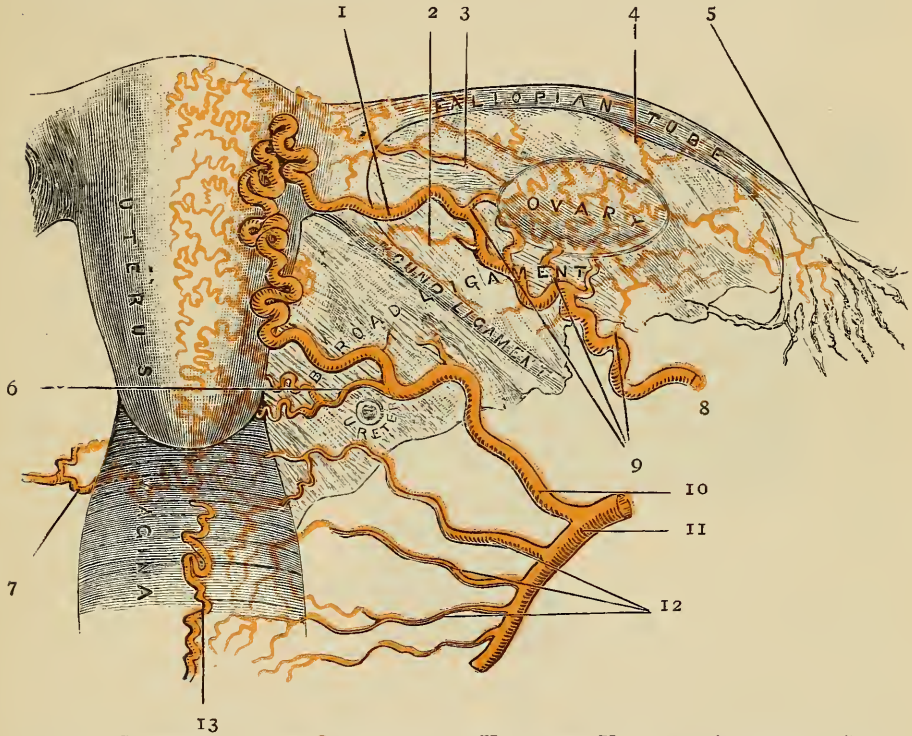

FIG. 13—SCHEME OF THE OVARIAN AND UTERINE, VAGINAL ARTERIES.—(*From Morris' Anatomy.*)

1. Uterine branch of ovarian artery. 2. Branch to round ligament, 3. Branches to isthmus. 4. Branch to ampulla. 5. Fimbriated extremity of Fallopian tube. 6. Cervical branch of uterine artery. 7. Coronal artery. 8. Ovarian artery. 9. Ovarian branches. 10. Uterine artery. 11. Internal iliac artery. 12. Vaginal arteries. 13. Azygos artery of vagina.

1. Of a mesh of connective tissue containing many spindle-shaped cells.
2. Of many tubular glands, which give the surface of the membrane a perforated appearance.
3. Of ciliated cylindrical epithelium, which lines the glands and the outer surface of the whole membrane.

The membrane lining the cervix is continuous with that of the body of the uterus, and is substantially the same except that it is thrown into numerous longitudinal folds with lateral branches—the "arbor vitæ" of the cervix. The epithelial cells in the upper two-thirds of the cervical canal are columnar, ciliated; in the lower third, stratified, squamous cells. In addition to the tubular glands of the uterine body, the cervical mucous membrane contains wide mucous crypts.

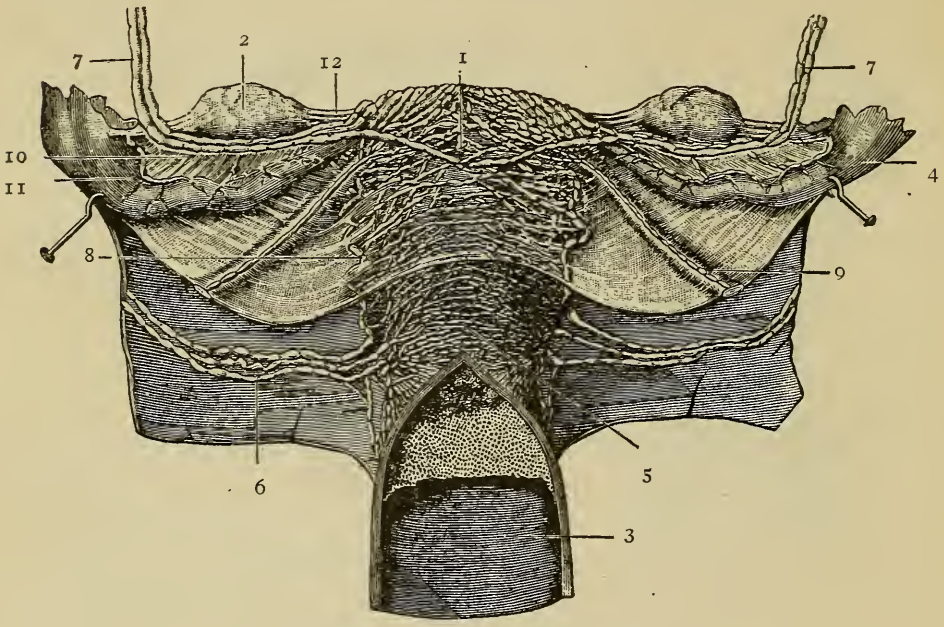

FIG. 14.—LYMPHATICS OF THE UTERUS.—(*Poirier.*)

1. Lymphatics from the body and fundus of the uterus. 2. Ovary. 3. Vagina. 4. Fallopian tube. 5. Lymphatics from the cervix. 6. Lymphatics going from the cervix to the lymphatic ganglia. 7, 7. Lymphatics going from the body and fundus to the lumbar ganglia. 8. Anastomosis of corporeal and cervical vessels. 9. Small lymphatic in round ligament going to the inguinal glands, 10, 11 Lymphatic vessels of the tubes emptying into the large lymphatic vessels from the body of the uterus. 12. Ovarian ligament.

What distinguishing peculiarity has the uterine mucous membrane?

It has no basement layer of connective tissue (submucosa), and merges irregularly into the muscular tissue.

What kind of mucus is secreted by the uterine mucous membrane?

A viscid, alkaline mucus.

What are ovula Nabothi?

These are racemose glands or crypts in the cervical mucous mem-

brane which sometimes become occluded, while the secretion continues until the gland becomes quite large and globular. They are frequently seen in cases of chronic inflammation of the cervix and are often a source of much irritation.

How does the peritoneum cover the uterus?

It completely invests the uterus above, in front as far as the junction of the body and cervix, where the bladder touches the womb, and behind as far as the junction of the uterus and vagina.

What is the broad ligament of the uterus or ligamentum lata?

The extension of the peritoneum over the uterus causes two folds of peritoneum to be brought together at its sides, and these extend across the pelvis, to be merged into the common abdominal peritoneum. These transverse folds, enclosing muscular and fibrous tissues, blood-vessels, nerves, and lymphatics, are called the broad ligaments, and divide the pelvis into two compartments; in the anterior one the bladder is situated, in the posterior, the rectum. The inner two-thirds of the superior margin of the broad ligament serves to transmit the Fallopian tube or oviduct. The portion of the broad ligament beneath the Fallopian tube is called the *Mesosalpinx*. It consists of two layers of peritoneum which are united by a small amount of loose connective tissue in which is imbedded the parovarian or organ of Rosenmüller. At its lateral margin the peritoneum covering the broad ligament is reflected upon the side of the pelvis. The inferior margin which is somewhat thick is continuous with the connective tissue of the pelvic floor. Through it pass the uterine vessels. The lower portion somtimes known as the *cardinal ligament of Kocks* or the *ligamentum transversale colli of Mackenrodt* or the *retinaculum uteri of Martin* is composed of dense connective tissue which is firmly united to the supravaginal portion of the cervix. The median margin is connected with the lateral margin of the uterus and encloses the uterine vessels. Through it certain muscular and connective-tissue bands extend from the uterus to the broad ligament. A vertical section through the uterine end of the broad ligament will show it to be triangular in shape with the apex above, while its base is broad and contains the uterine vessels. Its connective tissue is connected with the connective tissue of the pelvic floor and lying behind the bladder: This is called the *parametrium*. Vertical section through the middle portion of the broad ligament shows that its upper part is composed mainly of three branches in which the Fallopian tube, ovary and round

ligament are situated while its lower portion is not so thick as the first section.

What are the round ligaments?

They are two rounded cords, composed of fibrous tissue, interspersed with muscular fibers, which extend underneath the peritoneum, from the cornua of the uterus to the top of the pelvis in front. where they pass through the inguinal canal to be inserted in the connective tissue of the labia majora. The term ligamenta teretia is sometimes applied to the round ligaments.

What are the infundibulo pelvic ligaments?

These are the suspensory ligaments of the ovaries, one on either side. It is really the outer third of the superior margin of the broad ligament. It extends from the fimbriated extremity of the Fallopian tube to the pelvic wall. It serves to transmit the ovarian vessels.

What are the utero-sacral ligaments?

Bands of fibrous tissue which pass from either side of the uterus to the sacrum, and are of considerable strength. They are sometimes termed the retractores uteri. They extend from the posterior and upper portion of the cervix and encircle the rectum and are inserted into the fascia covering the second and third sacral vetebra. They are composed of connective tissue, some muscular fibers and are covered by peritoneum. They form the lateral boundaries of Douglas cul-de-sac.

What are the vesico-uterine ligaments?

Small folds of peritoneum which pass between the uterus and the bladder.

What is the normal position of the uterus?

The uterus is placed nearly in the center of the pelvis; so that a line drawn from the top of the symphysis to the middle of the second bone of the sacrum would touch its top. Its long axis is nearly parallel to the face of the sacrum and to the posterior wall of the symphysis pubis. The uterus is freely movable, and 1st, rises and falls with the respiratory movements, and 2nd, is pushed backward and forward by the varying conditions of fulness in the bladder and rectum.

What supports the uterus?

1st. The uterus is swung from the sacrum by the utero-sacral ligaments.

2d. It is slightly supported or belayed by the broad, round, vesico-uterine ligaments.

3d. The walls of the vagina act as a fleshy column of support, being in turn supported by the perineum.

4th. "The retentive power of the abdomen" (Duncan), due to the existence of a partial vacuum in the abdominal cavity, aids in maintaining the uterus in its normal position.

What is a double uterus?

A uterus containing two cavities separated by a longitudinal septum. This anomaly is also known as a *uterus septus bilocularis.*

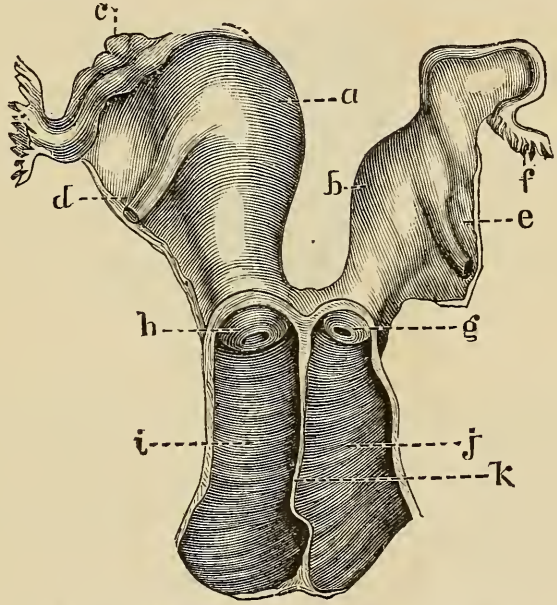

FIG. 15.—DOUBLE UTERUS. (*From Byford, after Ollivier.*)

a. Right cavity. b. Left cavity. c. Right ovary. d. Right round ligament. e Left round ligament. f. Left tube. g. Left vaginal portion. h. Right vaginal portion. i. Right vagina. j. Left vagina. k. Portion between two vaginæ.

Where two uterine cavities exist with but a single cervix, it is described as *uterus semi-partitus.* Occasionally the whole genital tract is double, the septum extending to the vulva, so that there are two vaginæ.

Sometimes a single cornu of the uterus is developed to such an extent as to be capable of containing a fetus during gestation. This condition is known as a *uterus unicornis.*

What is a uterus bicornis?

It is a two-horned uterus, and is caused by an incomplete fusion of Müller's ducts.

What is a uterus duplex?

It is two distinct uteri, and is caused by a lack of union between Müller's ducts throughout their entire length.

What is a uterus cordiformis?

This is a heart-shaped uterus, its peculiarity of form being caused by an incomplete development of the fundus.

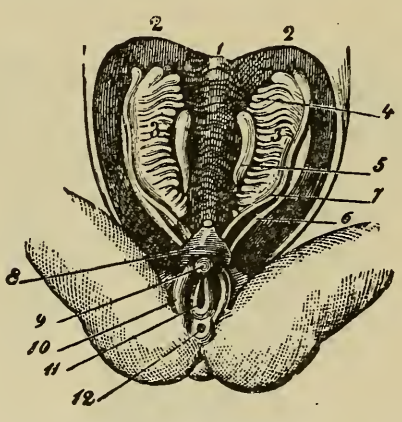

FIG. 16.—RUDIMENTARY SEXUAL ORGANS.—(*Luschka.*) The internal organs represented at the seventh week of fetal life; the external organs belong to a later period.

1. Spinal column. 3, 3. Wolffian bodies. 5. Glands destined to become the ovaries in the females, the testicles in the male. 6. Wolffian duct. 7, Filaments of Müller. 8. Bladder. 9. Tubercle, forming the rudiment of either the clitoris or penis. 10. Folds destined to form the albia majora (in the male the scrtoum). 11. Sinus uro-genitalis. 12. Anus.

What is the cause of all anomalies of uterine development?

Arrest of development of the embryo.

What are the Fallopian tubes, or oviducts?

The Fallopian tubes, or oviducts, are small tubes which extend from each cornu of the uterus. They are formed from the upper ununited parts of Müller's ducts.

What is their structure?

They are continuous in structure with the uterus, being mainly muscular, covered with peritoneum, and lined with a single layer

of ciliated columnar epithelium, whose wave-like motion is toward the uterine cavity. The mucous membrane is thrown into deep longitudinal folds, which become more complex as the fimbriated extremity is approached. There are no glands in the mucous membrane. The average caliber is one-sixteenth of an inch, and their length about 5 inches. For convenience in description the tube is divided into the uterine portion, isthmus, ampulla infundibulum.

The uterine portion extends from the cornea (including the portion within the uterine wall) to the upper angle of the uterine cavity. The *isthmus* is the narrowest portion immediately adjoining the uterus. It gradually passes into the wider lateral portion or *ampulla*. The infundibulum or fimbriated extremity is the funnel-shaped opening of the lateral end of the tube. It is the outer external end or that next the ovary.

The ovaries are two flattened almond-shaped organs whose principal function is the development and extension of ovules. Their average length during the child-bearing period is about 2.5 to 5 centimeters in length 1.5 to 3 centimeters in breadth and 0.6 to 1.5 centimeters in thickness (Williams). They vary considerably according to the age of the female and after the menopause markedly decrease in size.

What is the position of the ovaries?

The ovaries are normally situated in the upper part of the pelvic cavity, one surface of each ovary resting in a slight depression in the upper portion of the inner surface of the obturator muscle, the *fossa ovarica*. With the woman standing, the long axis of the ovaries occupy a nearly vertical position. When the woman is in the horizontal position on her back their position is nearly horizontal. They may vary somewhat in position. Each ovary presents for examination two surfaces, two margins, and two poles. The surface which is in contact with the ovarian fossa is called the lateral, while the one directed toward the uterus is known as the median surface. The margin which is attached to the mesovarian is more or less straight and is designated the hilum, while the free margin is markedly convex and is directed backward and inward toward the rectum. The extremities of the ovary are termed, the upper and lower or tubal and uterine poles respectively. In young women the ovary presents a smooth, dull white appearance through which glistens a number of small semi-transparent vesicles the Graafian follicles. In age the ovaries takes on a corrugated appearance.

What are the attachments of the ovary?

The ovary is attached to the broad ligament by the *mesovarian* which forms the posterior leaf of that structure. The *ovarian ligament* extends from the lateral and posterior portions of the uterus, just beneath the tubal insertion, to the uterine or lower pole of the ovary. It is several centimeters long and about 3 to 4 millimeters wide. It is covered by peritoneum and is composed of muscular and connective-tissue fibers which are continuous with those of the uterus. The *infundibulo pelvic* ligament or *suspensory* ligament extends from the upper or tubal pole of the ovary to the pelvic wall. It represents the portion of the upper margin of the broad ligament which is not occupied by the tube and through it the *ovarian vessels* gain access to the broad ligament.

For the most part, the ovary projects freely in the abdominal cavity and is not covered by peritoneum except near its hilum.

What is the structure of the ovary?

The structure of the ovary is composed of two portions: The cortex (zona parenchymatosa) and medulla (zona vasculosa). The cortex or outer layer varies in thickness according to the age of the individual becoming thinner with advancing years. It is in the cortex that the Graafian follicles are situated. The cortex is composed of spindle-shaped connective-tissue cells, through which are scattered primordial and Graffian follicles in various stages of development which become less numerous with the age of the woman. The most external portion of the cortex presents a dull white appearance and is designated the *Albuginea*. It is not analogous with the tunica albuginea of the testicle. On its surface is a single layer of cuboidal epithelium. The ovarian epithelium of Waldeyer.

The *Medulla* or central portion of the ovary (zona vasculosa) is composed of loose connective tissue which is continuous with that of the misovarian. It contains a large number of blood-vessels and a number of non-striated muscle fibers. It is by some classified as erectile tissue.

In the neighborhood of the hilum occasionally may be observed short ducts or tubes which are lined by a single layer of columnar epithelium. Their significance is obscure.

In the human fetus collections of epithelial cells are sometimes observed near the hilium. These are arranged in masses or strands sharply marked off from the surrounding stroma. These are the medullary cords of Köllicker.

The *nerve* supply of the ovary is derived chiefly for the sympathetic plexus while a few fibers are derived from the plexus surrounding the ovarian branch of the uterine artery.

The *arterial* supply of the ovaries is from the ovarian arteries.

The return flow of blood for the ovaries is through the ovarian veins forming later the pampiniform plexus which terminate as follows: the right emptying into the inferior vena cava, the left into the renal veins. The ovaries are generally believed to secrete or elaborate a secretion of their own and may be thus classed among the ductless glands. This secretion appears to have some important effect on the general economy of the female.

What are accessary ovaries?

These are small accessary bodies occasionaly found on the broad ligament in the neighborhood of the main ovary. They are usually small but may occasionally attain considerable size. They may result from faulty development but they are said more frequently to result from inflammatory changes during fetal life; small portions of the real ovary becoming cut off from the main body of the organ.

What is the parovarium?

The parovarium, or organ of Rosenmüller, consists of several tubes placed between the folds of the broad ligament. There is one on each side of the uterus. They are supposed to be the remains of the Wolffian bodies, and have no known function. They are analogous to the epididymis of the male. Very large cysts are sometimes developed from them.

What is the vagina?

A musculomembranous tube which serves to connect the uterus and its appendages with the outside of the body. It is attached above to the uterus and terminates below in the vulva. It is situated behind the urethra and bladder from which it is separated by the vesico-vaginal septum. Posteriorly between its lower portion and the rectum we have the perineum and recto-vaginal septum. Its median portion lies in close opposition with the rectum, while its upper portion is separated from it by Douglas cul-de-sac.

How is the vagina attached to the uterus?

It is inserted upon the outside of the womb, at the junction of the body and neck, so that the neck of the uterus projects into the tube at right angles when the uterus is in normal position.

What is the structure of the vagina?

It is composed of fibrous connective tissue and of muscular fibers, for the most part circularly arranged. The external coat is continuous with the ordinary cellular tissue or packing of the pelvis. The middle or muscular coat is composed of two layers of fibers, longitudinal and transverse. The muscular tissue is chiefly of the unstriped or involuntary variety. Within, it is lined with mucous membrane, which is reflected over the cervix uteri above, and below is continuous with the mucous membrane of the vulva.

How does the mucous membrane of the vagina differ from that of the uterus?

It is composed simply of flat or pavement epithelial cells, and has only a few glands. Numerous depressions or crypts in the membrane answer a similar purpose and secrete a mucus of acid reaction. In the virgin it is disposed in many transverse ridges, called rugæ.

How long is the vagina?

Its anterior wall is quite short, extending from the vulva almost directly to its point of insertion, a small pouch being formed above, called the anterior vaginal pouch, fornix or cul-de-sac. The posterior wall is longer, being prolonged upward to form a larger pouch behind the uterine neck, called the posterior vaginal or retro-uterine pouch, fornix or cul-de-sac. The lateral insertion of the vagina with the cervix form the lateral fornices or cul-de-sacs. The average length of the vagina is from 3 to 5 inches, varying in individuals and in races, 2 1/2 inches for the anterior and a little over 3 inches for the posterior wall (Lusk).

What is the blood supply of the vagina?

Its upper third is supplied by the cervico-vaginal branches of the uterine arteries. Its middle third by the inferior vesical arteries. Its lower third by the medium hemorrhoidal and internal pudic arteries.

The veins surround the vagina in an abundant plexus following the course of the arteries and eventually empty into the hypogastric veins.

The *lymphatics* from the lower third of the vagina empty into the vaginal lymph glands. Those of the middle third into the hypogastric and those of the upper third into the iliac glands.

The *nerve* supply of the vagina is derived from the hypogastric plexus and fourth and fifth sacral nerves.

Where is Douglas' cul-de-sac?

It is situated in the abominal cavity, directly behind the posterior vaginal pouch or fornix, and therefore between the vagina and rectum. It is a very important space, because, being the most

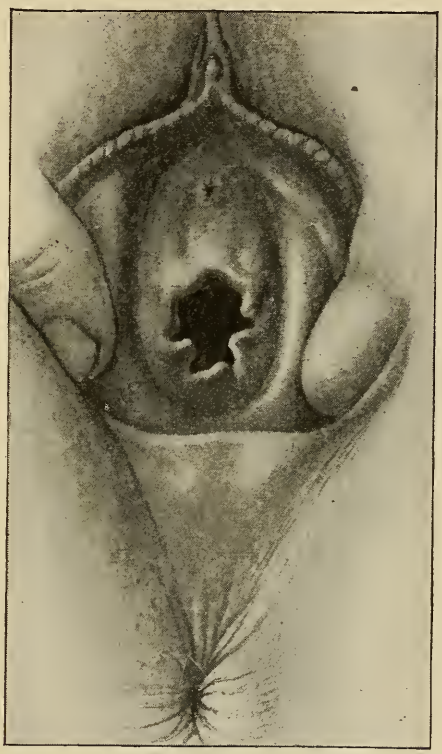

FIG. 17.—HYMEN ANNULARIS.—(*Montgomery.*)

dependent portion of the abdominal cavity, effusions of blood or other fluid and tumors of various kinds are often to be found in it.

How does the vagina terminate below?

It terminates in a circular fold of mucous membrane called the *hymen*. From the fact that this fold is often more developed in its posterior half, it usually appears as a crescentic fold, stretching across the opening of the vagina (see 8, Fig. 1).

What is an imperforate hymen?

The membrane sometimes completely closes the opening of the vagina, and is then said to be imperforate.

What is the structure of the hymen?

It is composed almost entirely of mucous membrane, and is easily torn by the entrance of the male organ, but is sometimes firm enough to resist any ordinary pressure, and may cause delay in labor by its presence. It may be absent at birth. While laceration

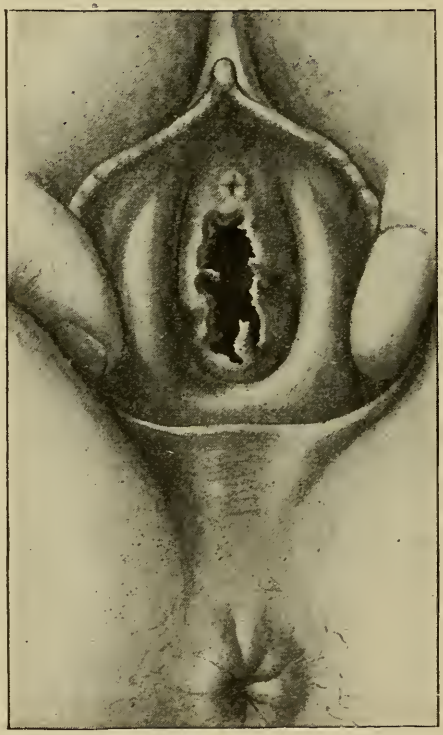

FIG. 18.—HYMEN SERRATUS.—(*Montgomery.*)

or absence of the hymen is supposed to be a mark of the lack of virginity such is not always the case. It may be lacerated by accident or by gynecological examinations. It is usually present, however, in a virgin. Various differences in the shape and appearance of the hymen are to be noted as the *hymen fimbriatum, hymen annularis, hymen cribriformis.* When the hymen extends

completely across the vaginal opening it is known as an *imperforate hymen.*

What are the carunculæ myrtiformes?

When the hymen is torn and greatly stretched, as by the passage of a child's head, or a large fibroid tumor, its fragments undergo atrophy, and there remain little, wart-like elevations in the line of the hymen, called carunculæ myrtiformes. It is said, however, that these

FIG. 19.—HYMEN CRIBRIFORMIS.—(*Montgomery.*)

bodies sometimes coexist with the hymen, being placed a little distance behind it.

What are the bulbs of the vagina?

They are masses of erectile tissue, mainly composed of short, venous sinuses, shaped somewhat like a pair of saddle bags, and placed over and at the side of the vagina. They are supposed to correspond to the two halves of the male bulbus urethræ.

What are the vulvo-vaginal glands?

The vulvo-vaginal glands, or glands of Bartholin, are two small bodies situated just behind the hymen, one on either side. They are embedded in the cellular tissue around the vagina, and empty by a small duct on either side. They secrete a thin mucus, which is expelled freely, and even by jets, during venereal excitement and coitus.

THE EXTERNAL ORGANS, OR PUDENDA

See Fig. 1

Describe the development of the external sexual organs?

Prior to the sixth week the external openings of the gut and of the urinary tract are received into a common tube, the *cloaca*, whose recto-uro-genital orifice is surmounted by a small conical elevation, the *genital tubercle.* The lower and posterior surface of this tubercle is divided by a furrow, the *genital groove* bounded by thickened lips, the

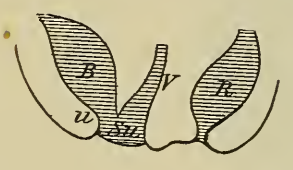

FIG. 20.—FORMATION OF PERINEUM AND URETHRA.—(*From Byford, after Schroeder.*)

Su. By descent of perineal tissue. *u.* Urethra.

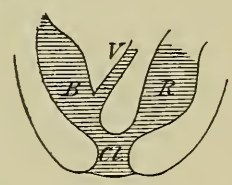

FIG. 21.—CLOACA FORMED WITH DESCENT OF THE TISSUE BETWEEN THE RECTUM AND THE ALLANTOIS. — (*Byford, after Schroeder.*)

V. Vagina. *R.* Rectum. B. Bladder. *Cl.* Cloaca.

FIG. 22.—FULLY FORMED GENITALS.—(*From Byford, after Schroeder.*)

The urogenital sinus forms the vestibule separated from the vagina by the hymen. *Su.* By descent perineal tissue. *u.* Urethra.

genital folds. Outside the latter a smaller fold constitutes the *genital ridges.* The end of the genital tubercle enlarges and becomes bulbous, forming the primitive glans of the future penis or clitoris. Toward the end of the second month the imperfectly formed septum between the rectum and the urino-genital passage reaches perfection, whereby the complete separation between the alimentary and genito-urinary canals is effected. In the male the genital tubercle elongates to form the penis; while the genital furrow on its under surface unites to form the penile portion of the urethra. Coincidently, the closure of the edges of the urino-genital passages takes place, the tube thus

formed becoming continuous with the anterior part of the urethra. The primitive genital ridges or outer genital folds unite to form the scrotum. In the female the genital tubercle remains small and becomes the clitoris, the genital furrow remains open, thus forming the lesser labia, while the external folds form the greater labia.

What is the earliest period of intra-uterine life at which the sex of the embryo can be recognized?

The sexual characteristics are well developed by the third month.

What is the vulva?

The name given to the external organs collectively, but often used to denote the genital fissure or vulval canal.

What are the labia majora?

Elevated folds of cutaneous tissue, which are found on either side of the genital fissure.

What is the structure of the labia majora?

They consist of cutaneous folds containing loosely arranged cellular tissue, with some fat. On the outer surface they are covered by a free growth of stout curly hair, similar to that found in the axilla. On their inner surface they are furnished with a considerable number of sebaceous follicles.

What is the mons veneris?

An eminence of cutaneous tissue, the anterior termination of the labia majora, situated directly upon the symphysis pubis. It is well padded with fat and covered with an abundance of hair.

What is the anterior commissure?

The point just under the mons, where the labia meet in front. The anterior limit of the genital fissure.

What is the posterior commissure?

The posterior limit of the genital fissure, or the point where the labia meet posteriorly. It marks the anterior boundary of the perineum.

What is the fourchette?

When the genital fissure is made to gape by the fingers pulling apart the labia majora, a fold of mucous membrane is made to project behind the posterior commissure, which is called the *fourchette.*

The little dimple or cup between this fold and the commissure is called the *fossa navicularis*, but neither of them have any existence until artificially produced in this manner.

What is the clitoris?

A small, cylindrical body, about an inch in length, which resembles and is the analogue of the male penis. It consists of two *corpora cavernosa*, which are attached to the under edge of the pubic bone, and by their free end project slightly under the anterior commissure. The part which is visible is about the size of a pea.

What are the labia minora?

Called also the *Nymphæ*. They are two folds of dartoid tissue, covered by skin, which cover the clitoris in a manner similar to the prepuce of the penis, and extend backward along the sides of the labia majora for about one-half their extent.

What is their structure?

It nearly resembles that of the male scrotum, inclosing also some erectile tissue.

What is the vestibule?

The space which extends from the clitoris to the opening of the vagina, and is bounded laterally by the labia minora.

What and where is the meatus urinarius?

It is the opening of the urethra, and is placed at the posterior limit of the vestibule, and therefore just above the opening of the vagina. It is situated in a tubercle or slight eminence.

How long is the female urethra?

About one and one-half inches.

How is the urethra situated with respect to the vagina?

It lies directly over it, and can be distinctly recognized, by the finger introduced into the vagina, as a tubular ridge above the anterior wall of the vagina.

What is the perineum?

The space between the vulva and anus, and bounded laterally by the tuberosities of the ischia.

How is the pelvic floor divided in its relation to labor?

Into two segments: a pubic and a sacral segment. The anterior or bupic segment is composed of loose tissue attached in front to the

symphysis pubis. It contains the bladder, urethra, anterior vesical wall, and the bladder peritoneum. The sacral or posterior segment is attached to the sacrum and coccyx. It consists of the rectum, perineum, and strong tendinous and muscular tissue.

What effect has labor on these segments?

During labor the uterine contractions draw up the pubic or anterior segment, while the posterior or sacral segment is pushed down by the presenting part.

What is the perineal body?

It consists of a wedge-shaped band of fibrous elastic tissue, which stretches across from one ischial tuberosity to the other, and is interposed between the termination of the vagina and rectum.

What other structures of importance are found in the perineum?

The transversus perinæi and levator ani muscles, and also fibers of the sphincter muscles, which are placed about the ends of the vagina and rectum.

PHYSIOLOGY

OVULATION

What is the function of the ovaries?

To furnish ova, or eggs, which are the primitive germs of the human being, and the necessary female element in reproduction.

What is the function called?

Ovulation.

How early in life does ovulation begin?

In childhood. (Sinedy and Hausmann found evidence of ovulation in 10 per cent. of infants examined by them.) But it does not occur with much vigor until womanhood.

Where are the ova found?

In small cystic bodies called ovisacs, or Graafian vesicles (or follicles), there being usually but one ovum in each ovisac.

How many ovisacs exist in each ovary?

There are variously estimated from 30,000 to 650,000 ovisacs or oocytes, but only a score or so can be observed at any one time. A very large number are said to disappear before puberty.

Describe the ovum when fully developed.

The ovum, when fully developed, is a spherical mass of protoplasm, 1/120 of an inch in diameter. It is structureless, except that it contains at one point a small body like a nucleus, called the germinal vesicle, which in turn contains a smaller body, like a nucleolus, called the germinal spot. The ovum is surrounded by a thin envelope of albuminous matter, called the zona pellucida, or vitelline membrane, but which is not a distinct membrane until after impregnation, the ovum itself being called, also, the vitellus or yolk.

Describe the process of ovulation.

The ovisac, at first very minute, is embedded in the cortical layer of the ovary. Its wall consists of a layer of cells, called the membrana propria, within which is found a second layer, the membrana granu-

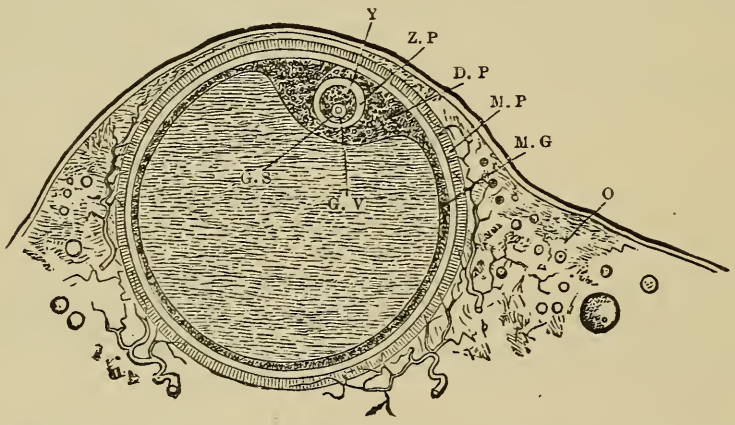

FIG. 23.—O. Ovarian tissue. Y. Yolk. Z.P. Zona pellucida or vitelline membrane. G. V. Germinal vesicle. G. S. Germinal spot. D. P. Discus proligerus. M. G. Membrana granulosa. M. P. Membrana propria.

losa. An accumulation of these cells form a little mound, called the proligerous disk, and in this the ovum is situated. These cells secrete within the ovisac an albuminous fluid. While the ovisac increases in size, it also approaches the surface of the ovary, having then attained a diameter of one-fourth to one-half of an inch. At this point is *stops growing*, while the fluid continues to be secreted in its interior. This finally subjects the ovisac and the overlying covering of the ovary to a bursting pressure; the ovisac is ruptured, and the ovum, with some of the fluid and epithelium of the ovisac, is extruded upon the surface of the ovary.

What happens to the ovisac after the discharge of the ovum?

Several things may occur:

1. The entire contents of the ovisac may be extruded, the walls collapse, and within a week or two a small linear cicatrix only is left to show that ovulation has occurred.
2. Some blood may be effused into the sac at the time of rupture. A clot is formed, which is slowly absorbed; as its hematin becomes faded and yellowish, it is called the *corpus luteum*.
3. Should the woman become pregnant, the walls of the ovisac may continue to secrete fluid. This is due to the increased blood supply which pregnancy occasions; and this leads to the formation of a large, yellowish body, called the *corpus luteum* of pregnancy.

What coverings has the ovum when it escapes from the ovisac?

It is covered externally by a layer of cells from the membrana granulosa, called the discus proligerus, internally by a thick transparent membrane termed the vitelline membrane, or, from the way in which it transmits light, it is called the zona pellucida. The ovum and zona pellucida are not, however, in immediate contact, for between them there is found a space, termed the perivitelline space, which permits ameboid movement of the protoplasm of the egg.

What happens to the ovum after its escape from the ovisac?

1. It may drop into the abdominal cavity and perish.
2. It is wafted toward the open end of the Fallopian tube by means of a current in the fluid bathing the tissues, which current is caused by the action of ciliated epithelial cells, and is always directed toward the tube.
3. The end of the tube may, by a spasmodic movement, clasp the surface of the ovary and draw the ovum into the tube.
4. When in the tube it is passed on to the womb (*a*) by a ciliary current, and (*b*) *possibly* by peristalsis, and from the womb it is discharged with the mucus, etc., unless fecundated.
5. It may become fecundated and remain within the mother until developed into a child.

How often does ovulation take place?

It is irregular in its occurrence. A number of ovisacs are constantly being developed, with greater or less rapidity, and the amount of the blood supply of the ovary controls the rate of development. Frequent coitus leads to frequent ovulation for this reason.

What is the usual interval between the discharge of successive ova?

Usually once a month, because the greatest increase in the blood supply occurs once a month, during menstruation.

MENSTRUATION

What is menstruation?

A periodical disturbance in the female, characterized by—

1. An increase in the vascular tension throughout the body.
2. A special determination of blood to the pelvic organs (or pelvic hyperemia).
3. A renovation of the uterine mucous membrane.
4. A discharge of blood mixed with mucus from the uterus.

How often does menstruation occur?

Once every twenty-eight days; but the interval varies in some women from three to six weeks.

What is the first evidence of menstruation?

An increase in the vascular tension and a sense of fulness in the pelvic region, which may be accompanied by pain.

What effect has the pelvic hyperemia on the ovaries?

By increasing the blood supply it hastens the development of the ovisacs, and one or more usually rupture at this time.

What effect has the pelvic hyperemia on the uterus?

The uterus becomes larger and softer, and its mucous membrane undergoes changes as follows: 1. New cells are formed. 2. The outer layer or layers of epithelium are thrown off. 3. The membrane is turgid with blood and thrown into folds. 4. There is increased functional activity in the mucous follicles, and a more abundant secretion of mucus. 5. Some of the superficial capillaries break down, and an oozing of blood takes place.

What is the clinical course of menstruation?

1. The woman notices a leucorrhea for one or two days.
2. A discharge of blood for three days (average).
3. A continuance of leucorrhea for one or two days.

Is menstruation attended with pain?

Not normally, but the majority of women experience some degree of pelvic pain, because the parts are hypersensitive, from some departure from the normal condition. The pain is usually referred to the "small of the back"; also to the ovarian regions and to the hypogastrium. There may also be present sensations of rapid changes of temperature, chilliness, or heat; the bladder may be quite irritable, and diarrhea may appear. Some women suffer from severe headaches and may become quite hysterical at these times. There may also be a sense of fullness and tingling in the breasts.

What peculiarities has the menstrual blood?

1. It is blood mixed with epithelial cells.
2. It does not coagulate when moderate in amount, because it is made acid by the vaginal mucus.

How much blood is discharged during menstruation?

From ℥ss to ℥iij in all; but the amount varies.

Is the blood during menstruation always discharged from the uterus?

No. The uterine mucous membrane sometimes fails to undergo its usual changes, and weakened capillaries in any part of the body may break down under the increased vascular tension. Thus we may have menstrual hemorrhage from the stomach, lungs, breasts, or any part whatever.

What is this condition called?

Vicarious menstruation, or xenomenia.

What is meant by supplementary menstruation?

Supplementary menstruation is a hemorrhage from any of the mucous membranes of the body, produced by the congestion incident to menstruation and coexistent with the usual discharge of blood from the genitalia.

What are the popular names for menstruation?

To be unwell; to see anything; to be regular; the periods; courses; sickness; monthlies; turns; changes, and flowers.

What is the object of menstruation?

To insure the development of *ova* by a periodical increase in the ovarian blood supply, and to favor the detention of the ovum in the uterus by the changes in the mucous membrane.

When do women begin to menstruate?
As soon as they become women, which period is called puberty.

When does puberty begin?
It varies from race, climate, and social condition. The average is at the age of fifteen years.

What physical signs attend the age of puberty?
The reproductive organs are fully developed, the breasts enlarge, the pubes is covered with hair, and the whole form of the girl becomes rounded and womanly.

What is nubility?
It is the period of life most suitable for reproduction.

When do women cease to menstruate?
At about the age of forty-five years, which period is called the *menopause* or *climacteric*, or "the change of life."

What symptoms usually herald the approach of the menopause?
Menstruation becomes irregular and finally ceases. Sudden flushes of heat and cold, and hyperemias of the cerebrum or of other organs of the body may appear. Some women are quite ill at this time.

What happens to the reproductive organs at the menopause?
They gradually atrophy, but the possibility of child-bearing may continue until the age of fifty-five (F. Barker).

Does the capacity for child-bearing cease with the menopause?
Usually it does; but as ovulation occasionally outlasts the menstrual function, impregnation may in some cases take place after the menopause.

Does impregnation ever take place before menstruation begins?
Ovulation sometimes precedes menstruation, and consequently such a case is possible.

What is the main function of the uterus?
To receive the fecundated ovum, and to retain it until it is developed into a mature fetus.

What is the function of the oviducts?
To convey the ova to the uterus, and the spermatozoa to the ova.

What is the function of the vagina?

It serves as a duct or outlet for the discharge of the uterine secretions, including the escape of the child in labor, and also to admit the male organ, so that the semen may gain access to the ovum.

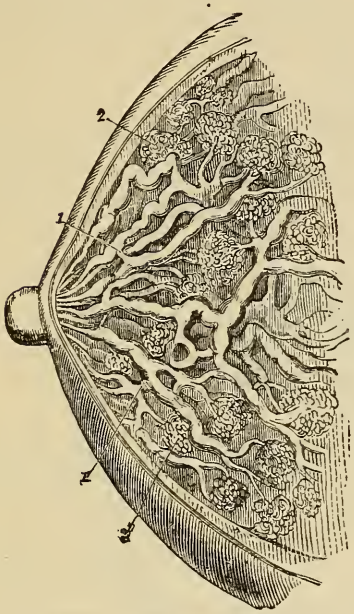

FIG. 24.—1. Galactophorous duct. 2. Lobuli of the mammary glands.

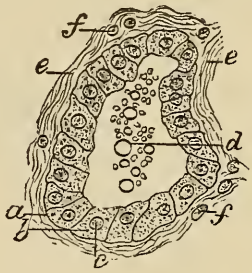

FIG. 25.—ACINUS OF MAMMARY GLAND.

What is the function of the external organs?

They are endowed with great sensibility, and are mainly concerned with the function of coitus. The nymphæ also serve to direct the stream of urine as it passes from the meatus urinarius.

What is the structure of the breast?

The breast is a gland of the racemose variety, and is composed of fifteen or twenty lobes of glandular tissue, with a packing of areolar and adipose tissue. The lobes are compounded of the lobules produced by the aggregation of the terminal acini, in which the milk is formed. The ducts of each lobule unite with each other to form a terminal canal, called the galactophorous duct, of which there is one for each lobe (Playfair). These empty upon the face or extremity of the cylindrical appendage called the nipple.

What is the areola?

A circular patch of cutaneous tissue around the base of the nipple, of pink color in virgins, and darker in those who have borne children and in brunettes. It contains also many sebaceous glands in addition to the glands or tubercles of Montgomery or Morgagni. No fat is found beneath the skin of the areola.

What are the glands of Montgomery or Morgagni?

Small tubercle-like projections occupying the inner circle of the areola. They enlarge greatly during pregnancy.

What is the nipple?

The nipple is a conical projection arising from the center of the areola. It is about half an inch in height.

Of what is the nipple composed?

Principally of the terminals of the galactophorus ducts, sebaceous glands, fat, connective tissue, longitudinal and transverse muscular fibers, and skin. It has also been supposed by some to contain erectile tissue.

Affections of the mammary glands will be treated in the chapter on "The Period After Delivery."

PREGNANCY

What is pregnancy?

The condition in which a woman contains a living and growing fetus.

What are the essential requisites for the occurrence of pregnancy?

1. That a fully matured ovum shall be recently discharged from the ovary.
2. That male semen shall come in contact with such an ovum before it leaves the uterus.

What synonyms are given for this act?

Fecundation, impregnation, incarnation, conception.

What is fecundation?

The act by which the male semen imparts to the ovum the power of developing into a fetus.

What part of the semen has this property?

The spermatozoa; each spermatozoön resembles a ciliated epithelial cell, except in being apparently structureless or homogeneous. Each drop of semen contains thousands, all of which are in constant vibratile motion during life. Their length is about 1/500 to 1/600 of an inch.

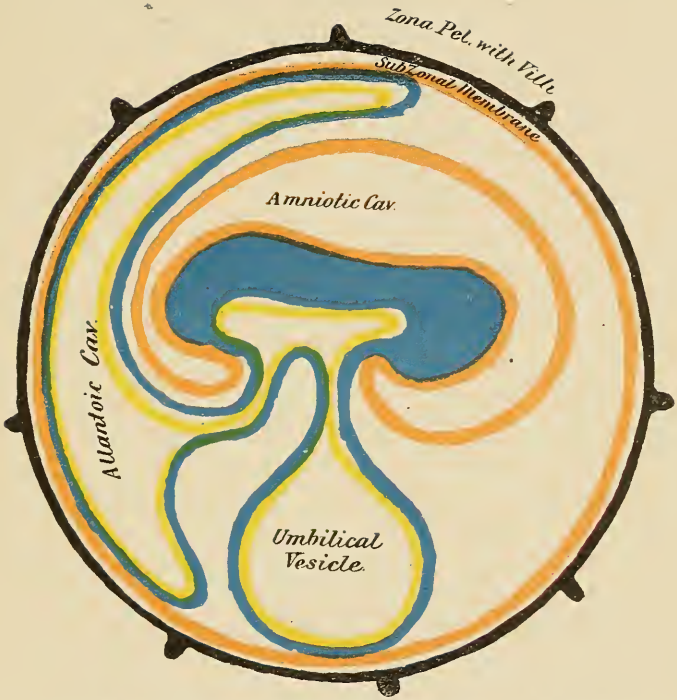

Diagram of the fetal membranes (structures which either are, or have been at an earlier period of development, continuous with each other are represented by the same color). In the center of the ovum can be seen the embryo itself. The diagram also shows the manner in which the three embryonic layers form the new being.

Red, EPIBLAST; *Blue*, MESOBLAST; *Yellow*, HYPOBLAST.

How long do the spermatozoa retain their vitality?

They have been found in full vigor eight days after their introduction into the vagina.

What is the average rate of motion in a spermatozoön?

About an inch in five minutes (*Henle*).

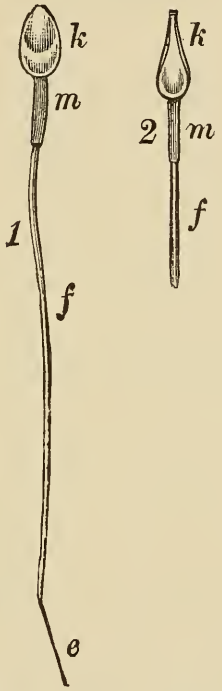

FIG. 26.—HEAD AND UPPER PART OF SPERMATOZOA.
1. Seen from above. 2. Side view.

What agents lengthen the life of the spermatozoön?

Their vitality is promoted by warmth, a slightly alkaline solution, the secretion of the uterus. It would seem also that it is possible for them to live for a considerable time in menstrual blood.

What agents destroy the life of the spermatozoön?

Injection of vinegar, acids generally, strong alkaline solutions, and bichlorid of mercury in a strength of 1 to 10,000 or 12,000; cold, while retarding their movements, does not kill them.

When is sexual intercourse most liable to be followed by conception?

During the week following the cessation of the menstrual flow, the probability being greatest in the earlier days and diminishing as the week advances.

Why is this not always true?

Because a woman may ovulate any time between the menstrual period.

How and where is contact between the spermatozoa and ovum brought about?

1. During coitus the semen is ejected against the cervix uteri and upper part of the vagina.
2. During the orgasm of the female the uterus sucks or pumps the spermatozoa into its cavity, after which their own vibratile motion causes them to ascend the oviduct until they meet the ovum.
3. Fecundation probably occurs most frequently in the oviduct. but it may occur at any point between the ovary and the os uteri internum.

Is it necessary for the uterus to aid the entrance of the semen?

No; fecundation has occurred when the woman was perfectly passive, or unconscious, from drugs, drink or sleep.

What further means are provided for the retention of the semen?

1. During the act of coition the round ligaments of the uterus pull it forward and upward. This permits the penis to glide past the cervix and to deposit the semen in the posterior vaginal pouch. When the ligaments are relaxed, the cervix resumes its former position, and thus retains the semen in the pouch above; the spermatozoa may then, at their leisure, enter the uterus.
2. It has also been demonstrated that fecundation can take place when the semen escapes upon the vulva, so that the whole distance may be traveled by the spermatozoa unaided.

What changes take place in the ovum after fecundation?

1. When the ovum is mature, two small cells are detached from the main body of cells; these are called polar globules. It was formerly supposed that these were associated with the disappearance of the germinal vesicle, but recent experiments have demon-

strated that the germinal vesicle plays an active part in their formation. This can take place independently of fecundation.

2. The portion of the ovum remaining after the throwing off of the polar globules is called the "female pronucleus."
3. Fecundation is effected by the penetration of the head of one spermatozoön. This is called the "male pronucleus."

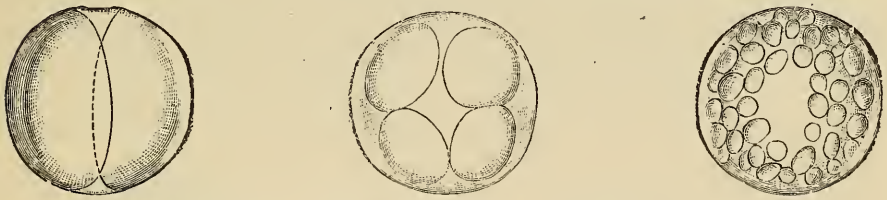

FIG. 27.—SEGMENTATION OF THE VITELLUS.

4. The male and female pronucleus coalesce. The ovum is now called the oösperm, or blastophere.
5. The *segmentation* of the nucleus and vitellus, *i.e.*, they both split into two masses, these into four, and so on until a large number of segments are formed. This is known as the morula, moriform body, or mulberry mass (see Fig. 27).

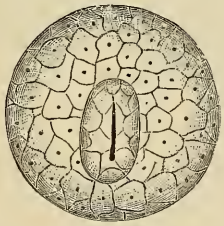

FIG. 28.—THE OUTER LAYER OF CELLS COMPLETED.
The primitive trace in the center of the area germinativa.

FIG. 29.—SECTION OF OVUM.
Shows embryo sinking in toward the center of the ovum, and the way in which the ammonion is formed.

6. A clear fluid is secreted within the ovum, which presses these segments to the surface of the ovum, where they form a double layer of cells, differing somewhat in size. The outer and larger is termed the *epiblast* or *ectoderm*, and the inner and smaller the *hypoblast* or *endoderm*. Together they are known as the blastodermic vesicle.
7. There then appears upon the outside of the vitellus, a small oval elevation, surrounded by a depression, which is called the *area germinativa*.

8. There appears in the area germinativa a small, dark line, called the *primitive trace.* About this line will be grouped the various parts of the embryo, the rest of the ovum serving only as a covering and for nutriment (see Fig. 28).
9. A covering for this trace or embryo is now formed. Thus far the vitelline membrane has been sufficient. The embryonic line sinks into the center of the ovum, while the edges of the external blastodermic layer about the area close around it, inclosing it in a sac called the *amnion.* Between the amnion and the embryo, fluid at a later period is deposited; this constitutes the liquor amnii (see Fig. 29). The vitelline membrane then disappears.

What is the mesoblast?

A line of cells developing later between the epiblast and hypoblast.

What are formed from each of these layers?

1. From the epiblast (ectoderm), the epidermis, hair, nails, the epithelium of the mouth, nose, and of the cloaca, glands of the skin, brain, and spinal cord, and organs of special sense.

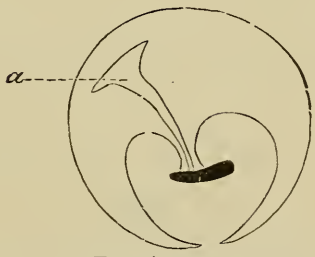

FIG. 30.—THE AMNION NEARLY COMPLETED.
The allantois carrying blood-vessels to the circumference (*a*).

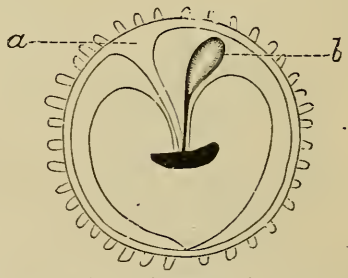

FIG. 31.—THE AMNION COMPLETED.
a. The allantois completed, having carried vessels into all the projections (villi) of the chorion. *b.* The umbilical vesicle.

2. Hypoblast (Entoderm); epithelium of walls and glands of intestines, epithelium of lungs and air passages.
3. Mesoblast (Mesoderm) furnishes the corium, muscles, bones, connective tissues, muscular layers of digestive tract, blood-vessels, and the genito-urinary system.

What is the allantois?

A vascular mass, called the *allantois,* shoots out from the caudal part of the alimentary canal of the embryo, and when it has reached

the inner surface of the ovum, spreads out, carrying loops of blood-vessels into the villi of the chorion.

In what manner, then, does the embryo receive its nourishment?

1. Before the formation of the allantois, the nutriment needed for growth is furnished (*a*) by osmosis of fluids from the tissues of the mother into the ovum, and (*b*) by the fluid materials of the ovum contained within the internal blastodermic layer. While the allantois is being formed, this internal layer contracts, its shrunken bulk constituting the *umbilical vesicle*, which finally disappears.

FIG. 32.—VILLI OF CHORION.

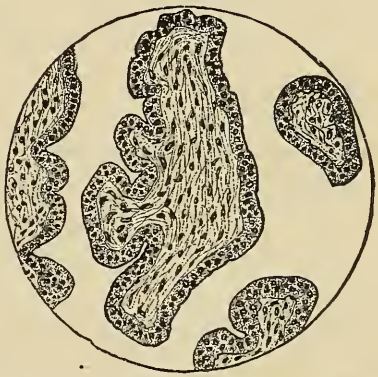

FIG. 33.—Same as Fig. 32 but seen with a high power.

2. By the time the allantois is fully formed, if not before, the ovum has reached the womb. Its villi, thus provided with blood-vessels, become enlarged and arborescent over that part of the ovum which is in contact with the uterine wall, but atrophy and disappear from the rest of its circumference.
3. When the ovum has reached the uterus, it is detained in a fold of mucous membrane and imbeds itself into it. The edges of the fold grow over the ovum, so as to give it an additional covering of mucous membrane, called the *decidua reflexa*.
4. When the ovum is thus fastened to the uterine wall, the chorionic villi increase in size, and form attachments to the uterine wall

underneath it, forming the *placenta*, by which a definite vascular connection is established between the embryo and mother.

5. The placenta being formed, the embryo is suspended in the amniotic sac by a cord reaching to the placenta, called the *funis*, or *umbilical cord*, and continues to develop to the end of pregnancy.

What coverings has the embryo at the period when placental circulation is established?

First, the amnion, the membrane nearest the fetal body.

Second, the chorion.

Third, the decidua reflexa and the general uterine wall.

What is the length of time taken by the ovum in passing through the oviduct to the uterus?

From seven to ten days.

What is the size of the ovum on its entrance into the uterus?

From 1/50 to 1/25 of an inch.

What changes in the mucous membrane of the womb follow fecundation?

1. The mucous membrane of the womb becomes hyperemic, and hypertrophied; it develops new and soft connective tissue, and is thrown into folds. In this thickened state it is called the *decidua vera*, or *uterine decidua*. (This occurs whether the ovum enters the womb or not.)
2. When the ovum enters, adjacent folds grow over it, forming the *decidua reflexa*, or *ovular decidua*. As the ovum increases in size, the decidua reflexa becomes united or welded with the superficial layers of the general mucous membrane, or decidua vera (about the fourth month).
3. That part of the membrane directly under the ovum, and to which the placenta is attached, undergoes greater changes, and is called the *decidua serotina*, or *placental decidua*.

Describe the development of the placenta.

1. The allantois, carrying with it the blood-vessels which are to connect the embryo with the periphery of the ovum, fuses with the chorion and carries into each villus of the latter small loops of blood-vessels. The chorionic villi atrophy over the whole ovum except that part which is in direct contact with the decidua serotina (placental decidua). The placenta is a separate organ at about the third month, and during this month its circulation is

complete. It is composed almost entirely of fetal tissue, the chorion frondosum, but when it is thrown off after labor, the superficial layer of the decidua serotina separates with it, forming its maternal surface.

2. The villi of the chorion frondosum are tufts of fetal capillaries covered with two (or more) layers of embryonal tissue derived from the epiblast (ectoderm) and mesoblast (mesoderm). The inner of these layers is composed of large nucleated cells (Langhans, layer), while the outer layer is simply a band of protoplasm in which are imbedded nuclei at irregular intervals. This outer layer is called the *syncytium*, and is supposed to have a phagocytic action. About the third month Langhans' layer disappears, leaving the villi covered only by the syncytium.
3. The villi branch in every direction, and coming in contact with the inner surface of the decidua serotina often appear on section to have dipped down into it, but that is only apparent and does not actually occur (Evans).
4. The maternal capillaries in the superficial layer of the serotina become immensely distended with blood, thus forming sinuses.
5. The superficial layer of the decidua serotina and the walls of the maternal capillaries are in time absorbed, probably by the phagocytic action of the syncytial cells, and thus the maternal blood is permitted to escape into the intervillous spaces.

The fetal villi are now in direct contact with the maternal blood, but there is no actual connection between the maternal and fetal circulations, as the walls of the villi and their coverings are still interposed.

Does the maternal blood enter the circulation of the child?

No. The fetus derives nutriment by endosmosis, through the delicate walls of the villi floating in the maternal sinuses—like the rootlets of a plant—absorbing the elements needed for growth, and discharging effete products by exosmosis. According to some, the villi dip into crypts or depressions of the *decidua serotina* and not into the sinuses, and absorb a secretion called *uterine milk*, which is furnished by these crypts.

What function has the placenta?

The functions of the placenta are varied. In a general way it assumes the place of the lungs, alimentary tract, liver and kidneys. It aerates the fetal blood supplying it with oxygen. It absorbs nourish-

ment from the maternal blood; it has been shown by some to have a glycogenic function such as the liver has in adult life and it also acts as an organ of excretion for the fetus.

What is the funis, or umbilical cord?

The veins of the placenta ultimately unite in a single vein, which passes to the umbilicus of the fetus. Two arteries pass from the fetus to the placenta, and are wound spirally about the vein. These three vessels are imbedded in a substance called Wharton's gelatin, and covered by a membrane derived from the amnion. The whole is called the funis, or umbilical cord.

Does the fetus excrete through the bladder and bowels during intrauterine life?

The kidneys begin to functionate about the seventh week. At first their ducts communicate with the rudimentary allantois but as the bladder is derived from the allantois, the ureters finally empty into that organ. In the course of development urine is excreted as can be proved by the presence of urea in the amniotic fluid. Albumin to a certain extent is always found in fetal urine. Edgar calls attention to an important medico legal point in connection with the fetal kidneys, namely, the appearance of dark yellow infarcts which are invariably present even if the infant has breathed but a short time before death. The bowels are normally inactive in intrauterine life except in pathological conditions such as apoplexy, coiled or compressed cord, etc. A discharge of meconium during labor should therefore always be diagnosed as a danger signal except in a normal breech presentation.

What are the knots in the funis?

The fetus in its active movements sometimes passes through a loop of the funis, and this, when drawn tight, forms a true knot. False knots are mere knobs or masses of Wharton's gelatin, formed at intervals along the cord.

What are the dimensions of the placenta and funis at full term?

The placenta is about 9 inches in diameter, and weighs 1 pound. The funis or umbilical cord averages about 20 inches, the extremes being from 3 to 4 inches in length.

Describe the fetal circulation.

The blood is propelled from the left ventricle of the fetus through

the aorta and iliac arteries to the point where the umbilical arteries are given off; through these to the placenta, and back again through the umbilical vein, to the liver, where most of the blood passes through the portal circulation and empties by the hepatic vein into the *vena cava;* the remainder, passing through the *ductus venosus*, empties directly into the vena cava without passing through the liver. From this it enters the right auricle, and is deflected by the Eustachian valve, through the *foramen ovale*, into the left auricle, and thence into the left ventricle. The blood, returning from the head and upper extremities, passes from the right auricle to the right ventricle; to the pulmonary artery through the *ductus arteriosus*, into the aorta. It will be noticed that the venous blood of the fetus is more oxygenated than the arterial. After birth the *foramen ovale* closes and the peculiarly fetal vessels disappear.

What are the characteristics of fetal blood?

In the early months of fetal life the fetal blood contains nucleated red blood corpuscles plainly distinguishable from those of the mother. At first these are few in number but they rapidly increase. About the third month the majority of these cells have been replaced by non-nucleated corpuscles similar to those of the adult. The relative quantity of the blood in the fetus and placenta varies; at first the placenta has the larger amount; later the fetus and placenta have about equal amounts, while toward the end of fetal life the fetus has considerably more blood than the placenta.

The arterial blood pressure in the fetus is about half that of the newly born child while the pressure in the veins is much higher.

What is the amnion?

It is the membranous covering next the childs body. At first it encloses only the dorsal part of the embryo but with the growth and closure of the body wall round the umbilicus it completely invests the embryo, except that the umbilical cord passes through it. It is continuous with the fetal epidermis at the umbilicus. It consists of two layers, one of flattened cells derived from the ectoderm and continuous with the epidermis, the other of connective-tissue cells, of mesoblastic (mesodermic) origin. The enclosed space between the two layers constitutes the true amniotic sac and its chief function is the secretion of the liquor amnii. At first the amnion as compared with the embryo is quite large but the embryo grows rapidly and the amnion closely invests it. At about the second month a rapid growth

of the amnion takes place which results in a close relationship between it and the chorion. As long as a space exists between the amnion and chorion the latter is filled with fluid somewhat resembling amniotic fluid. This is called the *false amniotic cavity*. At birth the *bag of water* consists of the amnion and part of the chorion.

What is the liquor amnii?

A clear, slightly saline fluid, secreted from the inner surface of the amnion, and in which the embryo floats.

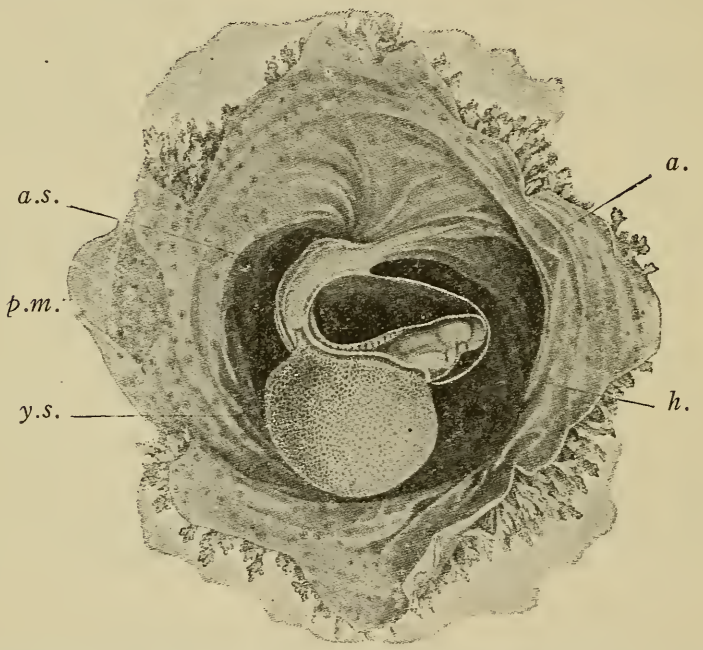

FIG. 34.—RUPTURED HUMAN OVUM FIFTEENTH TO EIGHTEENTH DAY. Amnion has been opened. *a,s.*, Allantois stalk; *p.m.*, parietal mesoblast; *y,s.*, yolk-sac; *a.*, amnion; *h.*, heart.—(*Coste.*)

How much liquor amnii is found at full term?

From half an ounce to several pints. The average is about a liter or pint. It is alkaline in reaction, with a specific gravity of about 1028 and consists of water about 99 per cent., a trace of albumin, creatin, epithelial cells, sebaceous material, urea and some inorganic salts. It may vary in color from an opaque white, greenish brown due to the presence of meconium or in some cases where the fetus is dead and macerated it is said to have been of a reddish color.

What are the functions of the liquor amnii?

1. It saves the uterus from the injurious effects of the fetal movements.
2. It aids in distending the uterus and allows freedom of movement to the fetus.
3. Prevents adhesions between the fetus and amnion thus tending to prevent fetal abnormalities and monstrosities.
4. It prevents the fetus from external violence such as blows on the mother's abdominal walls.
5. It serves to maintain the fetus at an equable temperature.
6. It serves to receive and dilute the fetal excretions. It is said by some that it is a source of nourishment to the fetus. This however is not generally believed.
7. It is possible that it supplies to the fetus by absorption a certain amount of water.
8. It forms one of the best possible hydraulic dilators for the cervix during labor.
9. After rupture of the bag of water and its escape during labor it acts as a lubricant and cleanser of the external birth canal.

In a healthy woman whose uterine cavity has not been infected previous to pregnancy the amniotic fluid is sterile.

How is the chorion formed?

The outer surface of the external blastodermic layer or that part which did not follow the embryo within the ovum, now becomes covered with small shaggy tufts which are the primitive chorionic villi.

Later the chorion develops a mesodermic lining. The outer layer is covered by villi showing slight cavities at their bases into which the mesoderm protrudes. The villi extend into the uterine mucous membrane in such a way as to indicate that epithelium, glands and walls of blood-vessels in this part are disintegrated and they protrude freely into the maternal blood. At a later period the villi are grouped in a band leaving the two flattened poles of the ovum bare. At a still later period each villus is filled with a tuft of blood-vessels derived from the mesoderm. The club-shaped villi of the early ovum soon begin to degenerate on the side next to the decidua reflexa until that part of the chorion is smooth. This is called the *chorion læve*. On the smooth area of the chorion next to the decidua serotina the villi become greatly enlarged and much branched, the embryonic blood-vessels following each ramification. This is called the *chor-*

ion frondosum and becomes the fetal part of the placenta. The cells of the outer layer of the epithelium develop rapidly, do not separate and form the *Syncytium*.

What is the decidua reflexa?

The decidua reflexa, circumflexa or capsularis or epichorial decidua (Edgar) is not as its name indicates reflected but is formed by growth of the uterine tissues over the ovum until they meet above its surface.

The decidua *vera* is thickest at the third month of pregnancy after which it steadily becomes thinner. In early pregnancy the ovum does not completely fill the uterine cavity but when this comes about the *vera* is compressed and begins to atrophy while the *reflexa* comes into closer and closer contact with it. At about the sixth month the two deciduæ cannot be distinguished. Until the fusion of these two parts of the decidua the interval between them is filled with fluid much like the liquor amnii. During the later months of pregnancy the decidua undergoes a fatty degeneration that assists in loosening its attachment to the uterus. The greater part of this membrane is cast off during labor. That part of it remaining in the uterus after labor is discharged in the lochia except a small part which assists in the formation of a new uterine mucosa.

How large is the ovum (and fetus) in different months?

By the end of the first lunar month of pregnancy the ovum is about the size of a pigeon's egg.

End of 2d month, size of a hen's egg; fetus an inch long.

End of 3d month, size of a goose egg; fetus 3 inches long.

End of 4th month, the fetus is 6.6 inches long.

End of 5th month, the fetus is 7–10 1/2 inches long.

End of 6th month, the fetus is 11–13 inches long.

End of 7th month, the fetus is 13.7–15 inches long.

End of 8th month, the fetus is 15–17 inches long.

End of 9th month, the fetus is 16–17 1/2 inches long.

End of 10th month, the fetus is 17 1/2–18 1/2 inches long.

[According to Schroeder.] American children are usually larger at birth.

How soon can the sex of a child be recognized?

Not certainly until *during* the fourth month.

What is vernix caseosa?

An unctuous sebaceous secretion covering the skin of the child for the purpose of lubricating it for delivery. It does not appear until the seventh month.

What is meconium?

The dark-green semi-fluid contents of the fetal intestine, corresponding to fecal matter in the adult. It contains granular bodies, called *meconium granules*, the presence of which is characteristic of meconium.

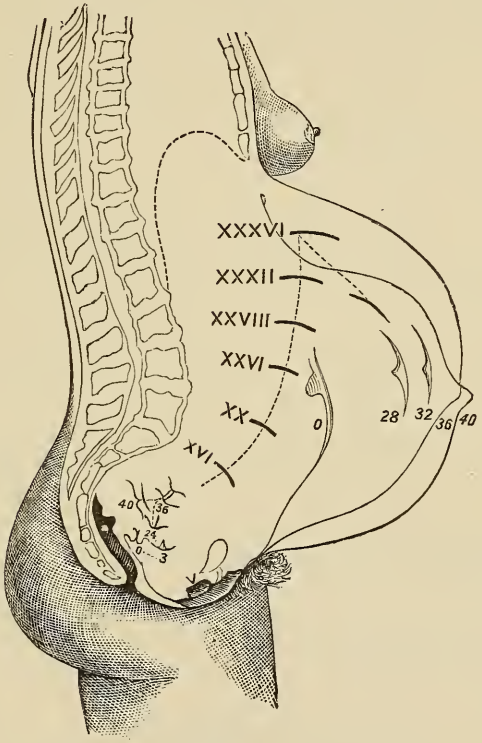

FIG. 35.

What changes occur in the womb itself during pregnancy?

It enlarges greatly, to accommodate the growing ovum, and at the end of pregnancy has a weight of 2 pounds, and its cavity is a foot in diameter. In the non-pregnant state the uterus is the shape of a pear flattened much in its anterior posterior diameter. Quite early in pregnancy it becomes more rounded and as it advances the

uterus becomes the shape of an inverted jug. As the fetus begins to distend the uterine cavity, the uterine wall becomes thinned. The lower uterine segment also forms in pregnancy. The cervix enlarges but little (not more than one-half), and its cavity remains separate until the last week or weeks of pregnancy, when the os internum may be stretched partially open and the cavities of the cervix and body of the uterus become one. The tissue of the cervix becomes softer to the touch.

What changes in position does the womb undergo?

During the first month the increased weight of the uterus causes it to descend somewhat in the pelvis, or become slightly prolapsed.

End of 2d mo.	Still low in the pelvis, and unusually anteverted. Bimanual touch shows it to be as large as a small orange.
End of 3d mo.	The same, but as large as a child's head.
End of 4th mo.	Fundus can be felt just above the symphysis, and, being too large for the pelvis, it now ascends.
End of 5th mo.	Fundus midway beteen umbilicus and symphysis.
End of 6th mo.	Fundus at level of umbilicus.
End of 7th mo.	Fundus 2 to 3 1/2 fingers' breadth above umbilicus.
End of 8th mo.	Fundus 1 to 2 fingers' breadth below ensiform appendix.
End of 9th mo.	Fundus touches the ensiform appendix.
End of 10th mo.	Fundus has descended to same position as in eighth month.

Why does the fundus of the uterus descend during the last month?

Because the cavity of the cervix is added to that of the fundus at that time, and the contents of the womb settle toward the pelvis, leaving more room above.

MULTIPLE PREGNANCY

How many children may a woman have at one time?

Two, or twins; three, or triplets; four, or quadruplets; five, or quintuplets.

How frequently do multiple births occur?

Twins, once in eighty-nine cases; the others are rare, and any over five are apocryphal.

How are mutliple pregnancies caused?

1. Two or more ova may be fecundated and simultaneously developed.
2. Two primitive traces may appear on one ovum, and each develop an embryo.

These two causes may be combined in the case of triplets, etc.

How may the cause be demonstrated?

Twins developed from separate ova will each have its own placenta and membranes; from a single ovum will have a single placenta, and usually but one set of membranes, though there may be two amniotic sacs.

What is superimpregnation?

The impregnation of two or more ova at the same coitus. It is simultaneous fecundation.

What is superfecundation?

The fecundation of two ova within a short period of one another but not at the same coitus.

How is this demonstrated?

By cases in which a woman has borne twins, one white, the other a mulatto, from separate intercourse with a white man and a negro.

What is superfetation?

The fecundation of a second ovum after a first ovum has entered the uterus. It may occur during the first four months of pregnancy, or before the decidua reflexa and decidua vera have become united.

How is this demonstrated?

1. By cases in which the birth of a fully developed child has been followed by a second birth, after an interval of one, two, three, or four months.
2. By the expulsion at one birth of a fully developed child and a fetus evidently one or more months less advanced in development.
3. By the extra- and intra-uterine pregnancies occurring simultaneously.

What is the clinical course of twin pregnancy?

1. Both children may be safely carried to term.
2. Both children may be prematurely expelled.

3. One twin may be prematurely expelled and the other remain until born at term.
4. One twin may die in utero and be retained until the birth of the other.

PATHOLOGY OF PREGNANCY

What is morning sickness?

Nausea and vomiting, just after rising in the morning. It is usually limited to the early months of pregnancy, or when the volume of blood is not yet increased, although there is not enough for mother and child. It is, therefore, due to the want of sufficient blood, and the consequent cerebral anemia due to the sudden change in the circulation upon awakening from sleep and resuming the upright position. The cause, probably, is the same, as produces other reflex disturbances at this time—namely, a sympathetic disturbance caused by the stretching of the uterine fibers by the growing ovum and consequent irritation of the uterine nerves.

A similar form of vomiting is sometimes met with at other times of the day, after special exertion, and especially mental effort. With the morning nausea not infrequently there will be anorexia or dislike for certain articles of food or craving for others. Constipation due to lack of intestinal peristalsis may coexist. The typical morning nausea may begin with conception but it is most commonly seen about the sixth week and lasts three or four weeks.

How should morning sickness be treated?

It is sometimes relieved by slowness in arising, and by taking a cup of coffee before rising, and may be cured by the use of nutrients and blood-making agents. It is best treated by the recumbent position and a light diet of small quantities of food at a time. The food should be easily digested and have little waste.

What is the "vomiting of pregnancy?"

Continuous or protracted vomiting in pregnancy depends—

1. On the deficiency and deterioration of the blood.
2. The irritable condition of the nerve centers, due to their impoverishment from defective blood supply.
3. To an exciting cause, such as disease of the uterus, acting with the other sources.
4. Hysteria.

5. Compression of uterine nerves due to the increasing size of the organ.
6. Autointoxication.

What are the indications for treatment in severe vomiting?

1. To remove any sources of irritation which may coexist with the general state of the blood. Thus, inflammation and abrasions of the cervix uteri may exist in some cases, and their removal by proper applications may cure it. Malposition of the uterus should be corrected.
2. To control the irritability of the nerve centers, which may be done by rectal enemata of chloral and bromid of potassium.
3. To improve the blood supply, by administering nourishing fluids in small quantities, frequently repeated, beginning with milk and lime water or better the use of predigested foods, peptonized, milk, panopeptone, etc.
4. When nothing can be borne on the stomach rectal feeding may be resorted to for a short time.
5. Small quantities of dry champagne, or the carbonated water may be used by the mouth. Some advise that the fauces should be sprayed with a solution of cocain before eating. In this form of vomiting as in others we have found an occasional gastric lavage of great use; a solution of sodium bicarbonate ʒii to the quart being used. The patient should always be in bed. Bowel irrigation of 4 quarts of normal saline solution may do good. A certain amount of this should be retained.

In mild cases any of the antiemetics may be used, as the oxalate of cerium, with or without the subnitrate of bismuth, or minute doses of cocain or carbolic acid. We have used with good effect in some of these cases the following:

Cocain hydrochlorate	gr. 1/4
Acid carbolic	gr. i
Cercium oxalate	gr. v
Sacch. lact.	gr. x

and repeat.

This should be given before taking food.

What is meant by the pernicious vomiting of pregnancy?

Pernicious vomiting of pregnancy, or hyperemesis gravidarum, consists in an intense aggravation of the usual nausea of gestation.

The vomiting is intense and persistent and is accompanied by all the symptoms of the profound toxemia or autointoxication. It usually causes death unless relief is afforded.

What are its causes?

Probably an aggravation of those producing the usual nausea and vomiting of pregnancy.

What are its characteristic symptoms?

The nausea and vomiting become constant and more and more severe. The vomited matter is first composed of food mixed with bile and mucus, and in the later stages with blood (coffee-ground vomit). The patient rapidly becomes weak and emaciated; the expression is anxious. As the disease progresses there is continuous fever, weak pulse, dry skin, throat and tongue dry, and breath foul. Thirst is excessive. The urine is scanty and high colored; albumin may be present and the amount of solid excretion is reduced. The urine may show the peculiarities found in any other form of the toxemia of pregnancy (see Toxemia of Pregnancy). Acetone and diacetic acid may be found in it, this is not necessarily due to the toxemia but may be from starvation. Diarrhea is a common symptom. Nausea and vomiting are continuous. There is pain in the head, over the stomach, or at the tip of the sternum. The extremities become cold and clammy. Later the fever increases, the pulse becomes small and thin—130 to 160. Delirium, syncope, or coma end the patient's life.

How would you diagnosticate pernicious or toxemic nausea?

The diagnosis is not easy and must be made by a thorough examination of the patient and her excretions, particularly the urine, after having excluded all neurotic elements and uterine displacements. Williams claims that in cases of toxemic nausea that great help can be obtained by a study of the ammonia coefficient—the relation of the nitrogen as contained in the ammonia to the total nitrogen content of the uterine. Normally this varies between 3 to 5 per cent. but under pathological condition may rise as high as 30, 40 to 50 per cent. These estimations require special apparatus and are difficult. In our own experience they have not been constant. A careful study of the blood pressure should also be made. We believe that in the majority of cases if no amelioration of the symptoms results after several days of rest, gastric and intestinal lavage and rectal feeding, the uterus should be emptied of its contents.

What is the treatment of the pernicious vomiting of pregnancy?

The principal indications are rest in bed, with the patient's head low. Almost all drugs have been used with varying results. All urine displacements should be corrected. Cocain or menthol may be applied to the cervix. An ice-bag may be applied to the abdomen. Rectal feeding may be resorted to if no food can be retained by the mouth. If all these measures fail and the patient is becoming exhausted, the pregnancy should be promptly terminated.

ABORTION AND PREMATURE LABOR

What is meant by abortion, miscarriage, and premature labor?

Abortion is properly the premature expulsion of the fetus before it is viable; when occurring during the first three weeks it is known as *ovular;* up to the fourth month *embryonic;* after the fourth month *fetal* abortion. It is also subdivided into *spontaneous* and *artificial,* the latter including (*a*) *therapeutic,* and (*b*) *criminal.* Abortion is described as *complete* when the whole ovum is thrown off, and *incomplete* when part of the ovum is retained within the uterus. In *threatened abortion* the amount of ovular detachment is slight. In *inevitable abortion* there is extensive detachment or rupture of the ovum with death of the fetus. Abortion in successive pregnancies is known as *habitual. Missed abortion* is when the fetus is retained in the uterine cavity for months or years after its death. *Premature labor* is the expulsion of the fetus after viability, but before full term. The older writers restricted the term abortion to the period before quickening (the child not being supposed to be living until then), and miscarriage to the period between quickening and viability. The term miscarriage is now usually applied to expulsion of the product of conception between the fourth and seventh months or after the placenta is formed; after that time it is known as premature labor.

What is meant by the term viable?

A child born after seven lunar months of pregnancy *may* live, and is called viable—livable.

What are the causes of spontaneous abortion?

Disease or injury (1) to the ovum or fetus, *ovular.*

Disease or injury (2) to the mother, *maternal,*

Disease in the father (3), *paternal,*

as

(1) *Ovular*—

(*a*) Syphilis.

(*b*) Placental apolexy and detachment, from hemorrhage.

(*c*) Placental degeneration; amyloid or fatty (cystic, *vide* hydatids).

(*d*) Dropsy of amnion.

(*e*) Violence, accidental rupture of the membranes, etc. The death of the fetus from any cause is not always followed by its premature expulsion.

(2) *Maternal*—

(*a*) Hyperemia of the pelvic organs from over-exercise, coitus, lifting, use of sewing machine, displacements of the uterus.

(*b*) Irritation of the uterus, as from tumors, mental shock, high temperature in fevers. Changes in the endometrium and placenta due to the toxæmia of pregnancy or nephritis.

(3) *Paternal*—

(*a*) Syphilis. (*b*) Coitus.

When may artificial abortion or premature labor be induced?

Where, after due consultation, it is determined that, in the first case, the mother's life, and in the second, the life of either mother or child, or of both, are in danger.

Name some special indications for therapeutic artificial abortion.

Eclampsia, obstinate, uncontrollable vomiting of pregnancy, bad and persistent cases of nephritis, advanced cases of uterine tumors, placenta prævia. Pulmonary tuberculosis rapidly advancing and in some cases of heart disease. Premature labor may be induced in cases of pelvic narrowing, where for any reason symphysiotomy or Cesarean section cannot be performed at term, where eclampsia is present or expected; in cases of habitually large fetal head or premature ossification of cranial bones; and in any condition gravely threatening the life of mother and child. (For method of inducing premature labor see chapter on "Induction of Labor.")

What are the symptoms of abortion?

1. Pain, more or less constant, felt in the back, hypogastrium, or ovarian regions.
2. Uterine contractions.
3. Hemorrhage.
4. Dilatation of the os uteri, with softening of the cervix.

What is differential diagnosis between threatened, inevitable, incomplete, and complete abortion?

Threatened Abortion.	Inevitable Abortion.	Incomplete Abortion.	Complete Abortion.
Hemorrhage, usually slight and free from clots.	Hemorrhage, profuse and continuous, clotted and dark colored,	Hemorrhage, persistent, at times profuse, at others scanty; dark colored, and offensive.	Entire cessation of hemorrhage.
Pain not marked.	Pain cramp-like and severe.	Occasional attacks of pain may be present.	Entire cessation of pain.
Os slightly patulous.	Cervical canal dilated.	Cervical canal dilated enough to admit finger, which feels parts of decidua, membranes, or blood clot.	Os retracted.
Uterus soft and enlarged, showing angle of anteflexion between upper and lower segment.	Uterus soft and enlarged; angle between upper and lower uterine segments effaced.	Uterus, soft, large, and baggy; not involuting.	Uterus large retracted and firm. Involution proceeding naturally.
Discharge is bright colored blood.	Discharge is dark blood, clots, and portions of ovum.	Examination of discharged material shows only fragmentary parts of ovum.	Discharge is ordinary lochia, which gradually ceases.
All signs of pregnancy present except amenorrhea.	All signs of pregnancy present except amenorrhea.	Signs of pregnancy arrested.	Subsidence of signs of pregnancy and possible establishment of milk secretion.

What are the dangers of abortion?

1. Hemorrhage; often great, because of the difficulty with which the ovum is separated from the womb.
2. Retention of the placenta, in whole or in part, with subsequent septicemia, hemorrhage, and other dangers.
3. The womb is apt to remain enlarged (see Subinvolution), and uterine disease may result.
4. Pelvic and peritoneal inflammation are more common after abortion.

FIG. 36.—CARL BRAUN'S DULL DOUCHE CURET.

When are the dangers of abortion most experienced?

In the middle third of the pregnancy. In the first three months the ovum is usually expelled entire, and the chief danger is from hemorrhage during the slow process of dilating the os uteri. In the next third, the attachments of the placenta are firmer than at any other time; the fetus is first expelled, and the placenta often expelled with great difficulty and piece-meal, combining all the risks at their greatest. In the last three months the process differs but little from normal labor, except in being slower.

What are the chief indications for treatment?

1. If the patient is seen in time, rest in bed, cold drinks, bromids, hypodermic injections of morph. sulph. gr. one-sixth, or a rectal suppository of 1 grain aqueous extract opium, and a light diet. The administration of the fluid extract of viburnum prunifolium combined with opiates is sometimes useful. The cause should be searched for and treated. Failing in this, the indications are:
2. To control hemorrhage.
3. To secure complete expulsion of the uterine contents.

How is hemorrhage to be managed?

1. By applying a tampon, under strict antiseptic precautions, until the os is sufficiently dilated.
2. By securing complete delivery and stimulating uterine contractions.

How is retained placenta to be managed?

The placenta must be detached by the fingers or curet, as soon as possible after the expulsion of the fetus. If pressure is made by one hand in the hypogastric region, the womb can usually be forced down low enough to enable the finger to reach to the fundus. A very good method of removing the placenta is by gently scraping it from the uterus by means of the douche curet of Braun, a hot antiseptic fluid of carbolic acid 1:40, creolin or lysol ℥j to the quart being passed from a fountain syringe through the curet dur-

ing the operation. A strip of antiseptic gauze should be carried to the fundus and the vagina tamponed carefully

How would you induce therapeutic abortion?

Either one of two methods may be employed:

1. If the patient is in early pregnancy and the abortion must be done at one sitting, and the cervix is moderately soft it may be dilated by the Hegar dilators. The whole aseptic hand covered by a rubber glove should be inserted into the vagina, one or two fingers inserted into the uterus should detach the ovum after which the cavity should be cleaned by the finger or dull curet and washed out.
2. If the cervix is not dilated or if sufficient time may be taken, the cervix may be dilated sufficiently to admit a strip of sterile gauze, the vagina should be packed with the same. This will usually insure softening of the cervix and the institution of uterine contraction which later will expel the ovum. If the ovum is expelled entire the cavity should be washed out with sterile salt solution or lysol 2 per cent.; if the placenta remains, a second packing of the uterus will usually cause its expulsion or the uterine cavity be cleaned out by the finger or a dull curet with irrigation. The advantages of the slower method are that it is less apt to be followed by secondary hemorrhage, the small placenta having time to become separated and the natural thrombi form in the placental site. A thorough cleansing of the vulva and shaving of the pubic hair should precede the operation and an aseptic vulvar pad should be used over the external genital organs. A light packing of the vagina may insure drainage. After uterine contractions have started, the extract of pituitrin given hypodermically may hasten the expulsion of the ovum.

What rule should guide us in difficult cases?

To persevere in efforts to remove the placenta as long as we are sure that our efforts are less injurious than allowing it to remain.

What is to be done when the placenta cannot be removed?

1. Use frequent antiseptic injections.
2. Employ remedies to guard against inflammation and septicemia.
3. Renew efforts to remove the placenta every day.

What causes premature detachment of the placenta (accidental hemorrhage)?

External violence and irregular contractions of the womb.

Diseases of the decidua, a very short umbilical cord may cause it also. It is said to be more common in multipara than primipara.

What symptoms does it cause and why?

Hemorrhage and intense colicky pains in the abdomen, but either may be absent. The hemorrhage may be *concealed*, *i.e*, the blood dissecting between the placenta and membranes without escaping from the womb, or in small quantity only. This will cause distention of the womb and pain. The amount of internal hemorrhage is often very great. The condition is one of the greatest gravity. The symptoms of concealed hemorrhage are paleness of the face, syncope, thirst, and rapid, weak pulse (120 to 130). The uterus will be found enlarged and soft. There will be some bleeding externally, but this is generally slight in comparison to the amount within the uterine cavity. Fetal movements are weak or absent altogether.

How would you diagnosticate partial separation of the placenta?

If the separation occurs at the upper part of the placenta (concealed hemorrhage), the main diagnostic symptoms would be the sudden anemia and shock, abdominal pain and rapid increase in the size of the uterus. If the lower part is detached and the hemorrhage is coming away (open hemorrhage), the condition may simulate placenta prævia. In partial detachment no placenta can be felt wholly or partially across the internal os and the attack is much more sudden than is placenta prævia where the hemorrhage usually is more constant and extends over a longer time.

What treatment is indicated?

Prompt delivery, on behalf of the child, which, after all, is usually destroyed by the impairment or total stoppage of the placental circulation; and also on account of the mother, if the hemorrhage is at all extensive.

1. The os uteri should be dilated sufficiently to allow the child to pass.

2. The membranes should be ruptured, and the child at once delivered by forceps or version. The membranes should not be ruptured until we can deliver, for the evacuation of the liquor amnii gives just that much more room for the effusion of blood, without any gain in uterine contraction. Uterine contraction

must be maintained after delivery by quinin, ergot, or by suitable packing and by friction for some time afterward.

3. The woman's strength must be maintained by hypodermics of strychnin, atropin, and ergotin, or by whisky and hot milk, and inertia guarded against.

Hypodermatoclysis, or the subcutaneous injection of a sterile solution of sodium chlorid, ʒj to the pint of sterilized warm water, should be used to maintain the fluids of the body and keep up blood pressure. If symptoms of hemorrhage are severe, the salt solution should be given directly into a vein (intravenous transfusion).

Delivery of these cases by celiohysterotomy would be perfectly justifiable if the patient could stand the operation. It offers by far the quickest means of delivery. Vaginal Cæsarean section has also been recommended. For either of these operations the patient should be in a hospital.

PLACENTA PRÆVIA

What is placenta prævia?

The implantation of the placenta upon the lower third of the uterine wall; to the part which dilates during labor or as the time of labor approaches. The placenta may be centrally placed over the os uteri; its margin may reach to the edge of the dilated os; or any degree between these extremes may be met with. It is, therefore, divided into *central*, *partial*, and *marginal* placenta prævia.

How and why does placenta prævia occur?

The ovum should be, and usually is, arrested as soon as it enters the womb, by a fold of the mucous membrane.

If these folds are not prominent enough, it may advance until it arrives at the os internum, where the placenta will then be found. It is, therefore, found principally in multiparæ, and in those whose organs are in a relaxed condition.

It is comparatively rare in primipara and increases in frequency according to the number of children a woman has borne. As causes are given multiple pregnancies, uterine malformation, changes in the uterine mucosa, diseases of the endometrium, etc.

What is the source of hemorrhage in placenta prævia?

The blood pours from the openings in the uterine sinuses when the placenta is detached, and not from the placenta itself.

How soon does placenta prævia cause trouble, and in what manner?

Rarely before the sixth or seventh month of pregnancy.

About this time the cervical segment, which is smaller than the fundal region of the womb, has nearly reached its limits of growth. The placenta then grows faster than the womb, and its edge is liable to become detached. Later in pregnancy the os uteri becomes patulous, and this again causes some separation of the placenta. As a result, hemorrhage occurs, more or less profusely. Usually, if rest is enjoined, the opened sinuses are closed by a clot, and the hemorrhage is arrested until further separation takes place.

What are the dangers in placenta prævia?

Death of the mother from hemorrhage, and of the child from asphyxia. The maternal mortality is one in four; fetal mortality, one in two or three. From the situation of the placenta and the constant separation of small portions of it leaving absorbing surfaces, infection is very much more liable to occur than in normal cases of pregnancy.

What treatment is demanded when it occurs before full term?

Rest in bed, with or without a *tampon*, will arrest hemorrhage for the time; the sinuses are closed by thrombi, and the case may go on to term or another hemorrhage. The patient should be allowed cold drinks; opium may be used where pain is present. If the hemorrhage is great, it is safer to induce labor at once than to wait. Occasionally no hemorrhage occurs during pregnancy, nor even in labor.

How should delivery be managed at full term?

1. The patient being under an anesthetic and all aseptic precautions having been observed. Introduce one or two fingers within the os (the hand being in the vagina) and dissect the placenta from the uterine wall for about 3 inches from the os uteri in all directions, pushing it to one side if necessary.
2. Rupture the membranes, and if there is an unfavorable presentation, turn the child and make the breech engage in the os; or, if the head presents, the forceps may be used, if speedy delivery is necessary. The uterus should be packed with aseptic gauze to prevent secondary hemorrhage. This is the conservative treatment of central or partial placenta prævia.

The strength of the woman is then the main point to be cared for. Tonic doses of strychnin and ergot should be given by hypodermic and if much hemorrhage has occurred the patient should receive intravenous injection of normal salt solution. There seems to be little doubt at the present time that if the patient is in à hospital and has not been infected by much handling, delivery by either vaginal or abdominal Cæsarean section offers the best results for both mother and child. There is much less danger of both hemorrhage and infection for the mother and a much better prognosis for the life of the child.

What complications may interfere with rapid delivery through the vagina?

A rigid and undilatable cervix, which is often present, because of the thickening of the tissues under the placental insertion.

How is this to be overcome?

In premature cases, or when we are not prepared to dilate, the tampon may be applied for some hours. Otherwise, the Molesworth, Barnes, or Bossi's dilators may be used to mechanically dilate the os, if the fingers cannot do it. It is much better to start the dilatation with the finger and when sufficiently dilated insert Barnes hydrostatic bags. Later the bag of Charpitier de Ribes may be used. When immediate delivery is imperative, the cervix should be divided by the "crucial" incision as far as the internal os.

What is a tampon, and how applied?

A tampon is a plug made of pieces of absorbent cotton, iodoform gauze, strips of sterilized muslin, or similar materials, packed into the vagina so as to restrain hemorrhage.

1. Place the woman in Sims' position, and introduce a Sims' speculum.
2. With a pair of dressing forceps introduce a small wad of absorbent cotton or a strip of gauze within the os uteri. Continue to add similar pieces until the whole upper part of the vagina is packed with them.
3. Gradually withdraw the speculum, continuing to add cotton or gauze until the whole vagina is packed.
4. Apply a compress and T-bandage over the vulva.

How long should a tampon be left in place?

Seldom over twelve hours, and in placenta prævia it may be necessary to remove it within an hour or two.

What effect has the tampon besides restraining hemorrhage?

It excites uterine contractions and aids in dilating the os. This should always be considered where these results are not desirable.

What cautions are to be observed with the tampon?

1. The tampons should be of iodoform or sterile gauze. If this cannot be obtained absorbent cotton may be used.
2. Never introduce it when the membranes have been ruptured, except in the early months of pregnancy, lest bleeding occur above it, distending the uterus.
3. Care should be taken after applying, to see that blood does not flow past or through it. There is no danger if it is properly applied.

What treatment should be used after delivery in placenta prævia?

In cases when the woman has been delivered by vagina, all lacerations should be repaired. Strychnin, digitalin (if needed) atropin and sterile ergot should be used hypodermatically. Saline solutions should be given intravenously if needed. The uterus and vagina should be packed with aseptic gauze and the vulva covered by a sterile pad.

When the patient has been delivered by a vaginal or abdominal Cæsarean section the treatment is the same as after the same operation for any other cause (see these subjects).

What complications may occur in placenta prævia after delivery?

The exposed sinuses in the cervical region may not be efficiently sealed, and hemorrhage may continue. The management will be as in post-partum hemorrhages generally.

What is a fetus papyraceus?

A twin dying in utero at an early period may be partly desiccated, and compressed by the growth of the other twin, being flattened and parchment-like in appearance.

What is a lithopædion?

A dead child may be infiltrated and encrusted by calcareous salts until it is stone-like in appearance. This occurs only after long retention in extra-uterine cysts.

ECTOPIC OR EXTRAUTERINE PREGNANCY

What is extra-uterine pregnancy?

Pregnancy in which the fetus is developed in some other locality than in the uterus.

What are some of the causes of ectopic pregnancy?

Broadly speaking, it may be produced by any condition which prevents or renders difficult the passage of the ovule to the uterus, but which at the same time is not sufficient to keep the ovule from being impregnated by the spermatozoa. The most common causes are old inflammations which have destroyed the cilia of the tubes, or small polypoid growths obstructing their lumen. They also appear in old primiparæ and in those who have been previously sterile. Fright during coition has also been given as a cause.

How is ectopic pregnancy classified?

1. The ovum, after fecundation, may remain in the ovisac and be developed in the ovary, called *ovarian* pregnancy.
2. The fecundated ovum may be arrested in the Fallopian tube, and be there developed, called *tubal* pregnancy. This is the most common form.
3. It may be arrested at the junction of a tube and the uterus (the narrowest part), and be developed partly in the womb and partly in the tube, called *tubo-uterine* or *iterstitial* pregnancy.
4. It may drop from the ovary into the abdominal cavity, and be there developed, called *abdominal* pregnancy.
5. The ovum may develop in one horn of a bicornate uterus.
6. It is also possible for the impregnated ovum to develop up to a certain stage in a hernial sac.

Are ovarian and abdominal pregnancies common?

Ovarian pregnancies are rare but do occur. Primary abdominal pregnancies are doubtful but attachments of the ovum to abdominal organs or to the broad ligament (secondary abdominal pregnancies), following rupture of an ectopic tubal pregnancy do occur and the fetus may be developed then if the patient survives the hemorrhage and shock of the tubal rupture.

What is the pathology of ectopic pregnancy?

The gestation sac is formed in tubal pregnancy from the coats of the wall of the tube, and the muscular tissue instead of undergoing hypertrophy often tends to disappear. Slight peritonitis sometimes appears and adhesion may form. The attachment of the ovum does not differ radically from that of normal uterine pregnancy. A placenta forms but the decidual structures are rudimentary, so that the chorionic villi penetrate into the gestation sac as far as the peritoneum. This

phenomenon by favoring hemorrhage tends to favor both abortion and rupture. The ovum may undergo early death in the tube and form a mole, or if rupture of the tube occurs the ovum expelled into the abdominal cavity usually perishes and if very young may be absorbed. In very exceptional cases it may thrive (secondary abdominal pregnancy). If the ovum escapes into the broad ligament death with molar formation may result, sometimes from suppuration. If the fetus dies after reaching an advanced stage of development calcification, adipoceration or mummification may result. The sac in this condition may remain quiet for years and afterward rupture into a viscus or cavity.

If the fetus does not die its tendency is toward poor nutrition and development and is frequently followed by fetal disease and deformities. If it reaches a viable age it frequently dies during its extraction or soon after. Exceptionally it is well developed and survives.

The changes in the uterus are much the same up to a certain point as those found in intrauterine pregnancy even the formation of the decidua vera. If the ovum dies these changes are arrested, otherwise they progress although at a slower rate than in an intrauterine pregnancy (after Edgar).

What effect has extrauterine pregnancy on the womb?

It enlarges as in normal pregnancy, up to the fifth month, and its hypertrophied mucous membrane or decidua is cast off in one piece, in several pieces, or in flaky shreds, at from the second to the fifth month.

What are the symtoms of extrauterine pregnancy?

Symptoms before rupture.

1. The symptoms of pregnancy in general.
2. The presence of a cystic tumor in the abdomen, usually to be felt also in Douglas' cul-de-sac.
3. The enlargement of the womb, and
4. The displacement of the womb by the tumor.
5. Irregular, sanguineous discharges from the womb.
6. The expulsion of the enlarged uterine mucous membrane (decidua).
7. Pain, irregular in occurrence, and of intense character.

When *rupture of the gestation sac* occurs, symptoms of rapidly developing shock and internal hemorrhage. When the rupture occurs between the folds of the broad ligament the danger of fatal hemorrhage and shock are much less than when rupture takes place at the upper

or lower part of the broad ligament. The hematoma however causes extreme pain from distention.

What points are especially important in diagnosis?

A rapidly growing tumor in Douglas' cul de sac, with an enlarged but *empty* womb, from which portions of decidual membrane have passed, can be nothing else than an extra-uterine cyst. The pain if present, is characteristic. Abdominal pregnancy *may* proceed to term without exciting any suspicions of its presence.

With what other conditions may extra-uterine pregnancy be confounded?

1. Intra-uterine pregnancy complicated with a fibroid tumor.
2. Intra-uterine pregnancy complicated with pyosalpinx.
3. Intra-uterine pregnancy with lateral flexion of the uterus.

How would you differentiate extra-uterine (tubal) pregnancy from intra-uterine pregnancy complicated with a fibroid tumor?

Tubal Pregnancy.	Intra-uterine Pregnancy with Fibroid Tumor.
The uterus is enlarged, but not to a size proportionate to the period of gestation.	The size of the uterus corresponds to or even exceeds that of an uncomplicated gestation.
On one side of the uterus will be found a rounded, highly sensitive, elastic or fluctuating mass.	The mass is uaually nodulated, hard, non-elastic, without fluctuation, and is not sensitive to touch.
There is a history of irregular menstruation. Menstruation may partially return early.	Usually there is suppression of menstruation.
Rupture of the gestation sac occurs.	No rupture.
Pain is an early and a prominent symptom.	Pain develops only after the tumor has reached sufficient size to press on the surrounding tissues.

How would you differentiate extra-uterine pregnancy from pyosalpinx?

Extra-uterine Pregnancy.	Pyosalpinx.
The body of the uterus is enlarged and softened. Cervix is soft and velvety.	Uterine body not enlarged; no softening of the cervix.
The tumor is small, very sensitive, and usually not bound down in the pelvic cavity.	The tumor is large, somewhat sensitive, firmly bound down in the pelvis, and is surrounded by a mass of lymph.
Rupture usually takes place about the third month.	The condition is subacute or chronic, and may extend over months. No rupture occurs.
Usually some history of sterility, with endometritis or salpingitis.	There is a history of acute attacks of peritonitis occurring at intervals.
Usual symptoms and physical signs of pregnancy present.	Usual symptoms of pregnancy absent.

How would you diagnosticate extra-uterine from intra-uterine pregnancy with lateral flexion of the uterus?

Extra-uterine Pregnancy.	Intra-uterine Pregnancy with Lateral Flexion of the Uterus (Dorland).
The body and cervix of the enlarged uterus are generally in a straight, vertical line.	The fundus lies to one side of the pelvis, with the cervix carried to the opposite side.
The extra-uterine gestation sac is in close proximity to the body of the uterus.	A deep sulcus may be felt between the fundus and the cervix.
The mass is closely attached to the fundus, and is readily outlined.	Examination shows a normal condition of the appendages.
The size of the uterus is below that indicated by the duration of pregnancy.	Size of the uterus corresponds to the period of gestation.
Menstrual history irregular.	Menstruation is suppressed.
Severe pain and rectal tenesmus.	Usually no pain; no rectal tenesmus.

What is the termination of extra-uterine pregnancy?

1. Rupture of the cyst occurs in 35 per cent., followed by internal hemorrhage, shock, peritonitis, and usually death.
2. The pregnancy may continue until full term, the child dies and (*a*) the tumor is partially reabsorbed, and remains innocuous, or (*b*) inflammation supervenes, and the child is decomposed and evacuated by ulcertaion into the rectum, vagina, bladder, abdominal walls, or uterus—the woman running the gauntlet of peritonitis, septicemia, pyemia, etc.

When does the rupture of the cyst occur?

In the first half of pregnancy; seldom in second half; usually about the third month.

What is the treatment for ectopic pregnancy?

If sure of the diagnosis, open the abdomen by an incision, ligate bleeding vessels, and remove all blood and fluids.

What is the general treatment of extra-uterine pregnancy?

Practically the only method of treating ectopic pregnancy is by operation.

If the condition is diagnosticated early or a pregnant tube found during operation for another cause it should be removed and the ovary unless involved or diseased let alone.

After rupture always operate; the ruptured tube should be found, tied off and removed, the abdomen sponged out, all blood removed and closed. If the patient should show the effects of severe hemorrhage and shock, stimulate and salt solution should be used intravenously. If one is sure that rupture has occurred between the folds of the broad ligament and a hæmatoma is formed it may be let alone for a while or drained through the posterior cul-de-sac or removed by section later. If *tubal abortion* has occurred, operation should be done, escaped blood clots, fetal tissue, etc., removed by sponging and the ruptured tube removed. The fetal sac should be extirpated.

If rupture occurs after the formation of the placenta, the sac should be opened, the fetus removed, the cord tied close to the placenta and the edges of the incision should be stitched to the external wound the sac being packed with gauze after careful cleansing with salt solution. The gauze may be removed in forty-eight hours or a glass drain may be used after the first packing is removed. This lessens the danger of hemorrhage and allows the placental circulation to cease. The placenta will then come away in pieces.

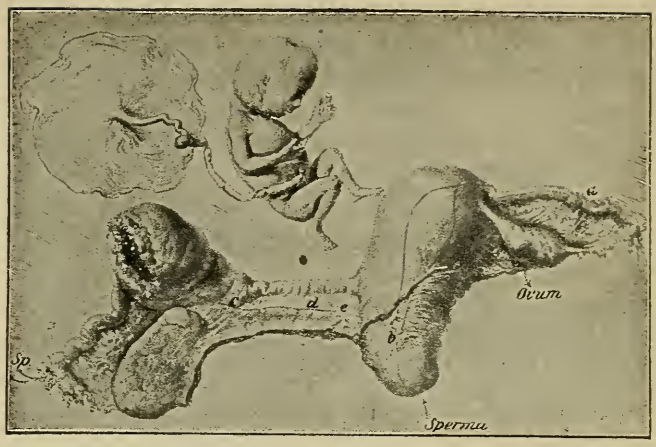

FIG. 37.—PREGNANCY IN THE RUDIMENTARY HORN OF A UTERUS UNICORNIS.
The rudimentary horn is shut off from the uterine cavity. The corpus luteum was found in the ovary of the opposite side; hence intraperitoneal transmigration of the ovum occurred.—(*Howard Kelly.*)

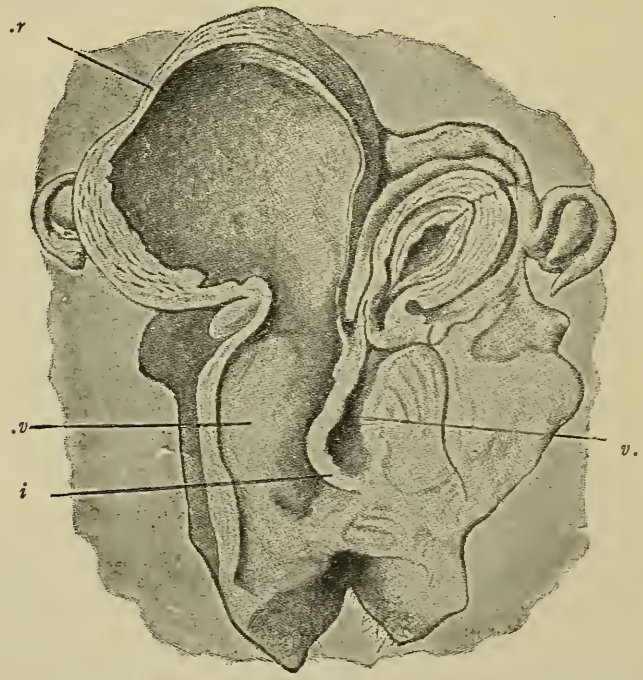

FIG. 38.—UTERUS DUPLEX BICORNIS, WITH A VAGINAL SEPTA.
The right uterus contained the product of conception and was 6 3/4 inches (17 cm.) long; the left uterus was filled with decidua alone and was 4 3/4 inches (12 cm.) long. *r*, Right uterus; *v*, right vagina; *i*, intervaginal septum.—(*Nagel.**)

What is cornual pregnancy?

Cornual pregnancy is the development of an ovum in one horn of a bicornute uterus or in one side of a double uterus. If the horn is well developed, delivery may be normal but if the horn is rudimentary and there is no normal communication with the lower genital tract the resulting condition is very much like extra-uterine pregnancy. The *symptoms* are much like those of ectopic pregnancy. When the pregnant horn is nearly normal in size or in a double uterus the pregnant tumor will be found more unilateral than normal and in some cases the empty horn or uterus can be demonstrated. The treatment is usually delivery by abdominal section.

What do we understand by missed labor?

It is a condition in which the fetus is retained in the uterus for any length of time beyond term. Usually some of the earlier symptoms of true labor come on, but do not continue. The fetus generally dies.

VARICOSE VEINS

What is the treatment of varicose veins of the lower limbs?

Rest in the recumbent posture, with regulation of the bowels. The leg should be elevated and an elastic stocking or flannel bandage applied; care must be taken not to apply too tightly.

What is the treatment for varicose veins of the vulva?

As much rest in bed as possible. An abdominal binder may be of some service. The bowels shoud be kept open, preferably by salines.

What is the treatment of rupture of a vein?

A compress should be applied over the point of rupture and a firm bandage applied, or a needle may be passed under the bleeding vein and a figure-of-8 ligature carried around it. In severe cases it may be necessary to cut down on the vein and ligate it. In some instances rupture of a vein below the skin may produce a hæmatoma of considerable size. Rest and cold evaporating lotions are the proper treatment.

What are salivation, chloasma, hirsuties?

(*a*) Salivation is an increased flow of saliva, usually found only in the latter half of pregnancy, and often accompanied by ulcerations in the mouth.

(*b*) Chloasma is an excessive deposit of pigment in the skin. Though

usually confined to the mammary areolæ and the brown line, it may occur on the face, the entire abdomen, and flexures of the joints, suggesting Addison's disease.

(*c*) Hirsuties is an excessive or abnormal growth of hair, usually on the face, and fortunately rare.

The treatment of these conditions is the same in the pregnant as in the non-pregnant state.

DISEASES OF THE ORGANS OF GENERATION

What is pruritus vulvæ?

An itching of the external genital organs.

What are its causes?

It may be caused by any irritative discharge from the vagina, due to malignant disease of the uterus, erosion of the cervix, cervical catarrh, etc. Diabetes may cause it, and also various local conditions of the vulva, as edema, eczema, herpes, follicular inflammation, or prurigo. Menstruation and pregnancy, by producing a congestion of the genitals, may produce a pruritus. Generally in pruritus vulvæ, occurring during pregnancy, there is no visible lesion of the parts.

How is pruritus vulvæ treated?

Treat the cause when possible. Strict cleanliness must be observed. The patient should wash the parts with any of the following: Lead-water and laudanum, applied hot, or a 2 to 3 per cent. solution of carbolic acid, or hyposulphite of soda ℥ss to Oj of hot water. These may be followed by dusting the parts with a powder of equal parts calomel and bismuth. Nitrate of silver, gr. viij to xij to ℥j, or beta-naphthol bismuth and sulphur ointment, may be used. An ointment of chloral hydrate and camphor, āā ℥ss, is sometimes of use. Aquæ rosæ has also been recommended. Warm bran sitz baths have been used with benefit.

How are vegetations of the vulva treated?

No active treatment is advisable, unless they become very large, as they disappear at the end of pregnancy; if removed, they are very liable to return. The surfaces should be kept apart and compresses saturated in a solution of carbolic acid, or Labarraque's solution, applied.

What is the treatment of leucorrhea.

If the discharge be slight, use tepid astringent injections: alum,

borax, sulphate of zinc, carbolic acid, chlorate of potassium, or common salt.

If the secretions are excessive and cause irritation of the genitals, the use of the cotton tampon is the best treatment. Take a dry tampon of cotton and enclose in it either boracic acid, alum, or the subnitrate of bismuth. Then introduce into the vagina and allow it to remain for twelve or twenty-four hours; after its removal use a tepid astringent injection. A tampon saturated with glycerin containing either boracic acid or tannin may be used in the place of the dry tampon. A new tampon should be introduced into the vagina every day for three or four days. If the leucorrhœa be specific in origin, apply to the vagina, either a solution of corrosive sublimate, 1 part to 1000, or nitrate of silver, 30 to 60 grains to the ounce.

What is the indication for treatment in prolapse of the uterus?

To reduce the prolapse: The patient should assume a recumbent position as often as possible and wear a pessary; in most cases the prolapse is spontaneously cured about the fourth month. In cases where a pessary cannot be worn, support the uterus with a cotton tampon. If the uterus protrudes externally and cannot be restored to its normal position, then a bandage must be applied to support it.

A pessary may be worn until the sixth month; the best instrument to use is Hodge's pessary.

After labor the patient should have a prolonged rest in bed and the prolapse should be permanently cured by some operative procedure.

Are anterior displacements of the uterus considered of importance during pregnancy?

No; they are seldom sufficiently marked to be pathological. In the multigravida, the uterus is always more or less anteverted, on account of the relaxation of the abdominal muscles. If the anteversion is moderate, no symptoms are produced; but if it is marked, there are constipation, tenesmus, pains in the lumbar and sacral region, and irritability of the bladder. Nausea and vomiting may occur.

What is the treatment of anteversion?

The bowels should be regulated, and the patient kept in a recumbent position. The uterus may be supported by the open cup-pessary of Thomas, or a horseshoe tampon of lambs' wool.

In the latter months of pregnancy an abdominal bandage must be firmly applied to support the uterus.

Is retroversion of the uterus a frequent complication of pregnancy?
No; it is infrequent in the impregnated uterus.

What are the results of retroversion?

1. It spontaneously rises into the abdominal cavity.
2. It remains below the promontory of the sacrum, and the cervix bending upon itself, it becomes a retroflexion.

What are the results of retroflexion?

1. It usually rises into the abdominal cavity and the pregnancy may continue to term.
2. Abortion may occur, the result of inflammation of the uterus.
3. The uterus may become incarcerated below the promontory of the sacrum.

What is the treatment of retroflexion?

If the uterus is movable, it should be replaced and a pessary worn until the fourth month. The Albert Smith or Hodge pessary will be found most useful. The bowels should be kept regular, and urine should not be allowed to accumulate in the bladder; there should be no compression around the abdomen, and straining at stool should be avoided. The patient should assume the knee-chest position for a few minutes every day, and when lying in bed should not be upon her back, but upon her side. If the uterus is immovable, gradual attempts to restore it should be made daily, as follows:

1. The patient assumes the knee-chest position, and the physician introduces two fingers, either into the rectum or vagina, and makes gentle pressure upon the fundus of the uterus; the uterus may be gradually restored in about a week or longer.
2. Press the body of the uterus up with the blade of a Sims' speculum, and at the same time catch the cervix with a tenaculum and draw it downward and backward.
   After the uterus has been restored to its normal position a pessary should be worn.
3. If this does not succeed the cervix should be grasped with a tenaculum or vulsellum forceps and the uterus drawn down sufficiently to clear the promontory. Two fingers in the posterior cul-de-sac should then press the fundus forward. This manipulation is usually successful especially if the patient is under an anæsthetic. If

adhesions exist binding the uterus posteriorly it may be better to replace the uterus following abdominal section and the breaking up of adhesions. Abortion is most apt to occur. If the uterus is adherent in retroposition the patient usually aborts and at the same result not infrequently follows attempts at replacement when adhesions occur. These patients should be attended in a hospital and for the physician's safety he had better have a consultation.

What are the symptoms of incarceration?

Retention of urine, in some cases associated with incontinence; or frequent inadequate and painful micturition; difficult and painful defecation; constipation; severe pains in the lumbar and sacral regions; a heavy bearing-down sensation in the pelvis; pain down the thighs; and, in some cases, œdema of the legs and feet. If the incarceration is not relieved, peritonitis and uræmia follow.

What are the results of incarceration?

1. Spontaneous restitution.
2. Abortion and recovery.
3. Cystitis; retention of urine.
4. Inability to empty the bowels.
5. Death from:

   (*a*) Metritis.
   (*b*) Perforation of the bladder.
   (*c*) Gangrene of the uterus.
   (*d*) Uræmia.
   (*e*) Peritonitis.

What is the treatment of incarceration?

The indication is to replace the uterus. The bladder and bowels should be evacuated, the former with a catheter; if this is found to be impossible, then aspirate about 3 inches above the pubes. In a number of cases spontaneous restitution occurs after the bladder is emptied; if this does not occur, then the uterus must be replaced. If the uterus is bound down by adhesions and cannot be restored, then abortion must be induced. If the cervix cannot be reached for this purpose, the uterine wall must be punctured through the vaginal vault in order to drain off the liquor amnii. It may then be possible to draw down the cervix and empty the uterus.

To restore the uterus place the patient in the knee-chest position and make steady pressure upon the fundus with two fingers either

in the vagina or rectum. In cases requiring the use of an anæsthetic, place the patient in Sims' latero-prone position and make pressure upon the fundus of the uterus by means of four fingers introduced into either the vagina or rectum. Playfair, in cases of incarceration, advises the use of a rubber bag introduced into the vagina and filled with water; the water must be let out every few hours to allow the woman to empty the bladder. Generally the uterus is replaced in twenty-four hours by this method.

After the uterus has ben replaced, the patient should wear a pessary. A relapse is not likely to occur. In very severe cases vaginal hysterectomy may have to be performed.

What are the causes of prolapse of the pregnant uterus?

This condition occurs only in the early months of pregnancy, as the result of traumatism or violent straining, or when the vaginal outlet is greatly relaxed or torn.

What is the treatment?

This consists in replacing the uterus and fitting a proper pessary or large wool tampon.

CONSTIPATION, DIARRHEA, INDIGESTION

What is the treatment of constipation during pregnancy?

Regulation of the diet; as a rule too much meat is to be avoided; fresh fruits, bread, and the grain foods are beneficial. Active purgation is to be avoided, as is also the continued use of any strong purgative drugs. The use of enteroclysis of 2 to 4 quarts of normal saline solution is to be recommended. It may be repeated about three times a week. Agents such as cascara, small doses of calomel, sulphate of magnesia, or the compound colocynth pill will do good. Diarrhea in pregnancy is rare; when it occurs, the cause should be sought for and treated. Indigestion—gastric or intestinal—should be treated by regulating the diet and administering such drugs as are ordinarily used. It must not be forgotten that persistent indigestion is often a symptom of the toxemia of pregnancy.

What are the causes of jaundice in pregnancy?

It may result from gastro-intestinal catarrh, toxemia, phosphorus poisoning, obstruction of the bile duct due to calculi in the gall-bladder, pressure by the uterus, or from acute yellow atrophy of the liver. It is often a source of grave danger to the fetus, and may produce abortion in the mother.

What is the treatment?

Regulation of the diet, warm alkaline douches, and calomel. In severe cases abortion may have to be induced. Calculi may require operation as in any other condition.

How is difficulty in urination caused?

During the first months the descent and anteversion of the uterus may cause pressure on the bladder. After the womb has ascended above the pelvic brim, there is rarely any difficulty until its descent, during the last week, when pressure is again caused.

How are the albuminuria and edema caused?

Small quantities of albumin may be found in the urine of pregnant women and may be due to the increased pressure in the renal circulation. The albumin in the urine is not accompanied by tube casts. It is a safe rule to go by that when casts and albumin exist for any length of time it is a danger signal.

Nephritis may coexist or originate with the pregnancy. It is a serious complication of the pregnant state and always renders the prognosis for both mother and child doubtful.

Edema, usually limited to the lower extremities and vulva, may be consequent upon renal disease or due to pressure upon the abdominal and pelvic venous trunks.

What is the treatment of nephritis in pregnancy?

Frequent examinations of the urine should be made. Meat must be excluded from the diet, and milk or foods containing milk substituted. The bowels must be kept open by calomel and salines, and the quantity of urine increased by diuretics. For diaphoresis, sweet spirits of niter, infusion of digitalis, Basham's mixture, and the hot pack may be employed. An examination of the eyes should always be made to determine the presence of albuminuric retinitis, and if that condition is found, abortion must be performed at once. The *symptoms* are the same as in nephritis at any other time.

How are constipation and hemorrhoids caused?

Constipation may be due to the deteriorated (hydremic) state of the blood, but it is also due to direct pressure of the uterus upon the bowel, impairing its tonicity, or even acting mechanically. Hemorrhoids are caused in the same way.

How is dyspnea caused?

By pressure upon the diaphragm. It therefore appears late in

pregnancy, and is usually relieved during the last weeks by the descent of the uterus.

What is the prognosis of pulmonary tuberculosis in pregnancy?

Most unfavorable. The patient may seem to improve during early pregnancy, but the disease makes rapid advances after delivery. The effect of the pregnancy upon a tuberculous patient should be watched carefully and if her strength should fail the uterus should be promptly emptied and the pregnancy terminated.

What is meant by plethora in pregnancy?

The natural increase in the blood-making function is occasionally excessive, and too much blood is furnished, leading to attacks of vertigo and other symptoms of that condition.

What effect has pregnancy on diseases of the heart?

Unfavorable. Pregnancy increases the danger of heart lesions. Abortion is apt to occur. Complications to be dreaded are failure of compensation, due to overtaxing of the heart or to fatty degeneration, and pulmonary congestion.

What forms of neuralgia are met with in pregnancy?

Almost any form. The most common is odontalgia. Toothache is due (1) to the "cry of the nerve for healthy blood," and (2) to the fact that phosphate of lime is largely needed in the construction of the fetus, and when not sufficiently present in the food, may be absorbed from the teeth.

What mental disturbances are met with in pregnancy?

The woman may become irritable, peevish, and capricious. She may have absurd cravings for strong or extraordinary articles of food (pica), or may even develop mania. The latter however is apt to be a manifestation of some form of toxemia

What effect does pregnancy have on chorea?

It is more common in primigravidæ. Pregnancy increases the number and severity of the attacks. Abortion is common.

What is the treatment?

The same as in the non-pregnant state—tonics, antirheumatics, and outdoor life. Arsenic, the salicylates, and cimicifuga have been especially recommended as remedies.

What effect has pregnancy on the infectious diseases generally?

It increases the gravity of the prognosis both for mother and child.

The danger to both increases in proportion to the height of the temperature. The child may die from the disease or be expelled prior to viability. Probably the most dangerous to mother and child is variola.

What are some abnormalities of the placenta?

1. Position—a low attachment gives rise to placenta prævia.
2. Size { Abnormally large. / Abnormally small.
3. Weight.
4. Shape—usually round, may be irregular or horseshoe shaped.
5. Number.
6. Edema.
7. Degeneration of villi, due to fibrous, caseous, fatty, calcareous, and myxomatous degenerations.
8. Syphilis.
9. Hemorrhages.
10. Cysts.
11. Tumors { *a*. Carcinomata. / *b*. Sarcomata. / *c*. Malignant growths at the placental site, usually carcinomatous.

From what are these tumors developed?

The sarcomata from the decidual cells; the carcinomata from the syncytium.

Do we have metastasis?

Yes.

What is placenta membranacea?

Placenta membranacea is one in which the villi persist over the entire surface of the chorion and are of equal development.

What are battledore placenta and velamentous insertion of the cord?

Battledore placenta is a form in which the cord is inserted at the margin of the placenta.

If the vessels from the cord branch out before reaching the placenta, it is termed a *velamentous insertion* of the cord.

What is placenta succenturia?

Placentæ succenturiæ are masses of placental tissue produced by the growth of isolated patches of chorionic villi. The vessels of each

patch course along the decidua to unite with those going to the cord. Each child may have its own placenta in multiple pregnancies.

What is the diagnosis of the death of the fetus?

1. Failure, after repeated examinations, to recognize the fetal heart sounds and fetal movements.
2. The uterus ceases to grow and becomes flabby.
3. The breasts decrease in size and become soft.
4. Peptonuria and disturbances of the renal function.
5. Diminution of the cervical temperature.
6. The patient's health deteriorates; she suffers from chilly sensations and a feeling of weight in the hypogastrium. This only occurs if the membranes rupture and infection occurs.
7. If the head of the fetus can be felt through the os uteri, the bones will be found to be loose and movable.

What is the duration of pregnancy?

Between insemination and labor two hundred and seventy-five days; between the end of menstruation and labor two hundred and seventy-eight days. It is impossible to know the exact duration of pregnancy unless we can ascertain the precise moment of conception.

HYDATID PREGNANCY

What is hydatid pregnancy?

Pregnancy in which cystic degeneration of the chorionic villi occurs, caused by a hyperplasia of the mucous tissue, normally forming the fundamental structure of the villi and giving rise to what is called a hydatidiform mole.

1. The villi are converted into cysts arranged like bunches of grapes, in size from a hemp seed to a bean.
2. The embryo dies and is absorbed.
3. The uterus is finally filled entirely with small cysts, whose average size and appearance are those of a white currant. It occurs about once in two thousand pregnancies.

What is the microscopical appearance of these cysts?

Their surfaces show the usual epithelium of the villus, but beneath this is a delicate layer of cells, spindle or stellate in character. These enclose the gelatinous semi-fluid masses which are produced by a myxomatous degeneration of the cells. The blood supply of the vesicles is generally much decreased. A secondary increase of the fibrous portion of the villi sometimes occurs.

What are its symptoms and termination?

1. The pregnancy begins normally, but in the second or third month—
2. A sudden and rapid increase in size of the uterus occurs, accompanied—
3. By pain and irregular discharge of blood and water.
4. Labor supervenes and the mass of cysts is expelled.

It should be remembered that true hydatids (echinococci) may occur in the uterus, but not as a result or accompaniment of pregnancy.

What is the prognosis?

The danger to the child is in direct proportion to the extent of villous involvement. As a general rule, the child dies. About 13 per cent. of women who are affected with the disease die.

What secondary dangers have resulted from this condition?

Destruction of uterine tissue by penetration of the diseased villi into the sinuses, causing adherence of the placenta. Perforation of the uterus may occur. Uterine rupture has followed this disease. Death may occur from hemorrhage. Chorioepithelioma may appear secondarily.

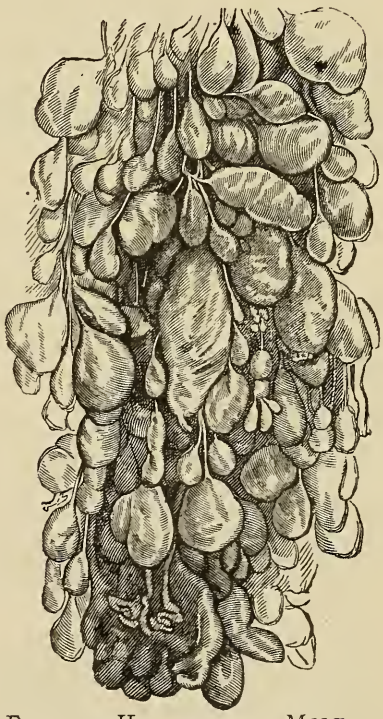

FIG. 39.—HYDATIDIFORM MOLE.

What is the treatment of hydatidiform mole?

As soon as discovered, the uterine contents should be evacuated at once, providing the fetus is dead. The strictest antisepsis should be employed. The patient should be carefully watched for several months afterward for chorioepithelioma.

What is mole pregnancy?

1. At some time during the first three months of pregnancy a hemorrhage takes place in the ovum.
2. The embryo is destroyed and disappears, while the vitality of the chorion is maintained for several weeks or months.

3. Labor supervenes, and a fleshy, laminated mass or *mole* is extruded, in which close search will always reveal chorionic villi and patches of the fetal membranes.

What is hydrorrhœa gravidarum?

A watery discharge from the uterus, from—

1. Hydatid pregnancy.
2. A tear in the fetal membranes at a point remote from the os uteri, with gradual leaking of liquor amnii.
3. Probably from a watery secretion, or transudation from the uterine mucous membrane, caused by increased proliferation of the uterine glands of the decidua vera.

What is myxoma fibrosum?

This is a rare disease affecting the placental portion of the chorion, and occurs in the latter part of pregnancy. It consists of a fibroid degeneration of the connective tissue of that part of the chorion which is situated over the placental site, accompanied by the formation of small growths. The latter subsequently undergo a myxomatous degeneration. The condition is also known as fibromyxomatous degeneration of the chorion.

What is chorioepithelioma or malignant deciduoma?

This is a malignant degeneration of retained decidual debris, characterized by a tendency to the formation of metastatic deposits throughout the body, and proving rapidly fatal in from five to six months after delivery. It may follow cystic disease of the chorion. (Dorland.)

What is the treatment?

Hysterectomy. Curettage and packing with iodoform gauze are sometimes resorted to, but the growth promptly returns.

What other name is sometimes given to these growths?

Syncytial tumors.

What is placental apoplexy?

(*a*) An effusion may take place directly into one or more placental cotyledons, forming small soft clots.

(*b*) In this form destruction of portions of the placenta takes place, forming irregular cavities which are surrounded by infiltrated and reddened areas.

(*c*) The effusion occupies a number of irregular cavities of varying sizes which are not surrounded by areas of infiltration.

What are the characteristics of a syphilitic placenta?

A syphilitic placenta is characterized by its thickness and density; its surface and substance are studded with cherry-like nodules. It color is paler than normal.

What is calcareous degeneration of the placenta?

Calcareous degeneration of the placenta consists of deposits of lime salts in the placenta in the form of fine sand-like particles or as scales, and usually occur at the edges.

What are white infarctions?

White infarctions are yellowish or grayish masses of degenerated placental tissue, and are of no pathological significance, except they be extensive, when fetal death may result.

What is fatty degeneration of the placenta?

Fatty degeneration of the placenta is due to local obstruction of the blood supply to the part affected. If the area is extensive, the fetus is liable to perish from disordered function of the placental blood supply.

What are some of the abnormalities of the amnion?

1. Abnormalities of secretion. { Oligohydramnios. / Hydramnios.
2. Abnormalities of consistency, color, and chemical constitution.
3. Putrefaction of liquor amnii, usually associated with death and putrefaction of fetus. An intense putrid odor of the liquor amnii, with physometra, has been noticed, yet the child has been born alive.
4. Adhesive inflammation and formation of amniotic bands. These bands may even amputate limbs and also cut off the blood supply by becoming wrapped around the cord.
5. Cysts.

From what source is the amniotic fluid obtained?

From both mother and fetus.

(*a*) It has been demonstrated by injecting sodium sulphindigolate into veins of pregnant rabbits and afterward the blue coloration was found in amniotic fluid.

(*b*) The excretion of urine during the latter part of fetal life reaches to a considerable amount. More than three pints have been found retained in fetal urine.

HYDRAMNIOS

What is hydramnios?

An excess in the amount of liquor amnii.

What is the etiology of hydramnios?

There are various theories, as follows:

1. Patulous condition of the vasa propria.
2. Disease of the fetal heart, lungs, or liver.
3. Increased activity of the kidneys.
4. Changes in the maternal circulation.
5. A morbid condition of the decidua, chorion, and amnion.
6. Syphilis.

The disease is more frequent in multigravida than in primigravida.

How many forms of the disease are described?

Two: an acute and chronic form.

What are the symptoms of hydramnios?

1. Rapid development of the uterus.
2. The uterine walls are tense and elastic.
3. Obscure sense of fluctuation.
4. Fetal heart sounds faint or absent.
5. Fetus cannot be recognized by palpation.
6. The cervix is high up and more or less shortened.
7. The fetus moves from one position to another with great ease.

Other symptoms are: dyspnœa, palpitation of the heart, irritability of the stomach, edema of the lower extremities, and inguinal, lumbar, sacral, and abdominal pains.

The symptoms occur, as a rule, about the fifth or sixth month; in some cases earlier. The accumulation of fluid is gradual.

In the acute form the accumulation of fluid may take place in a few days; in addition to the symptoms of the chronic form, fever, vomiting, and intense pain are present.

What is the diagnosis?

The diagnosis depends upon the subjective and objective symptoms already described. Braxton Hicks' sign is of great value in determining the existence of pregnancy. Hydramnios may be mistaken for a multiple pregnancy.

What is the prognosis?

Very grave for the child: nearly one-fourth die. The prognosis for the mother is favorable, unless the disease is associated with an organic affection of the heart. The danger of post-partum hemorrhage should not be forgotten.

How is the treatment divided?

Into 1, the expectant plan; 2, the active plan.

The former consists of the use of an abdominal supporter and refraining from active exercise. The latter, or active plan of treatment, is indicated whenever grave symptoms are present, due to over-distention, and when there are serious disturbances of the mother's heart. The indication is to induce abortion or premature labor. The membranes should be punctured high up, and in the interval of the pains. The hand should be used as a plug in the vagina to prevent the rapid discharge of the liquor anmii. If the presentation is normal, leave the further progress of the case to nature; version is indicated if the fetus presents by the shoulders. Prophylactic measures should be taken against post-partum hemorrhage.

What is oligohydramnios?

A deficient amount of amniotic liquid. The quantity may be so far below normal as to seriously interfere with the growth and development of the fetus, and may cause premature expulsion or deformities. The cause is unknown.

THE SIGNS OF PREGNANCY

What are the signs of pregnancy?

The symptoms and physical signs caused by the changes taking place in the woman, and by which we recognize the occurrence.

How may they be classified?

1. Into certain and presumptive, or
2. Into objective and subjective, or
3. According to their etiology, viz.:

I. Signs due to the increase of vital activity.
II. Signs due to the development of the womb.
III. Signs due to the presence of a fetus.
IV. Signs due to the unequal development of the general and generative systems, or semi-pathological signs.

What do we understand by the objective, or certain signs of pregnancy?

They are those which the obstetrician can see, feel, and hear for himself, by the use of various scientific methods.

What is Abderhalden's test for pregnancy?

This is a biologic test for pregnancy and depends on the presence of certain ferments found in the blood serum of pregnant animals or in the pregnant human female. This test is considered fairly reliable but is very complex and for the detailed description the student is referred to "Webster's Diagnostic Methods" or other text-books.

What are the subjective signs of pregnancy?

Those which are given us by the words of the patient herself.

What are the signs due to an increase of vital activity?

The pregnant condition requires that the woman shall supply, not only the needs of her own organism, as before, but shall also build up from 10 to 20 pounds of highly organized tissue, viz.: the child and its envelops. *Therefore*, she will need more blood, and, in general, all the vital forces must be increased. This is brought about by the *stimulus* of fecundation, and results in (*a*) increase of appetite, (*b*) weight, (*c*) vigor, and, perhaps, (*d*) sexual appetite. She must eat more in order to make more blood; the increased blood supply will increase her weight and general vigor, while locally the hyperemia of the pelvic organs may cause, at first, an increase in the sexual desire.

Is this class of signs always present in pregnancy?

No. The general system may fail to respond to the stimulus of fecundation, and these signs will be absent or defective, being replaced by the fourth class.

What signs are due directly to the development of the womb?

1. The descent of the womb, due to its increased weight, causes the abdomen to become smaller and flatter during the first month or two. The umbilicus also becomes deeper, for the same reason.
2. Afterward the womb enlarges at a *particular rate*, differing from that of other tumors.
3. Certain changes occur in the body of the uterus, the cervix, vagina, and external organs.

What changes are found in the cervix?

It becomes *softer* and deeper red in color; in many cases, the mucous membrane has a bluish tint. The ascent of the uterus and

retraction of the vagina give the sensation of *shortening*, though in reality it becomes longer. Some increase in the mucous secretion of its cavity is also noticed.

What changes are found in the body of the uterus?

It becomes more globular or jug-shaped, and can be easily recognized in all the vaginal cul-de-sacs, but particularly the lateral and posterior ones. The body also becomes softer. Palpation of the lower uterine segment by means of the finger in the posterior cul-de-sac will demonstrate considerable softening. The above are diagnostic points which can be recognized early (about the second month) in pregnancy and are of considerable value. This softening of the lower uterine segment is also known as *Hegar's sign* of pregnancy?

What changes occur in the vagina and external organs?

The increased blood supply causes the vagina to become deep red or violet in color; the external organs are somewhat enlarged, and the perineum is doubled in its antero-posterior measurement, during pregnancy.

With what other tumors may the pregnant womb be confounded?

The enlargement of the abdomen may be due to *fibroid, ovarian,* and other pelvic tumors; to *ascites, flatulence,* or even *excessive deposits of fat in the abdominal walls or mesentery.*

Give differential diagnosis between fibroid tumors and pregnancy.

In *fibroids,* palpation shows the uterus to be hard, resisting, and irregular in shape. Menstruation is present, often profuse. The fetus cannot be outlined, nor its heart-sounds heard. Fibroid tumors are of slow growth. In *pregnancy,* the uterus is more regular in shape and growth; menstruation is generally absent; the increase in the size of the uterus is rapid; fetal heart-sounds can be heard, and the fetus outlined by palpation.

Between ovarian cyst and pregnancy.

An ovarian cyst is apt to be unilateral in location, its growth is slow, and the general health is bad, as is shown in the face and form of the patient. Fluctuation and signs of fluid are present; menstruation is present. The objective symptoms of pregnancy are absent. In *pregnancy,* the tumor is median in position; grows more rapidly; the health is generally good; very little or no fluctuation, except in hydramnios, when the fluctuation is principally in the upper part of the abdomen; subjective and objective symptoms present.

Between ascites and pregnancy.

In *ascites* there is general fluctuation, percussion dulness increasing from above downward. When patient is lying on her back, it is clear in the median line, becoming dull as we proceed toward the flanks. Subjective and objective signs of pregnancy are absent. In *pregnancy*, fluctuation is absent, except in hydramnios; percussion shows dulness in the median line, clear at the flanks; dulness remains constant.

Between excessive deposits of fat in the abdominal wall and pregnancy.

The first occur late in life; the patient shows similar deposits of fat in other parts of the body; objective and subjective signs absent.

What is spurious pregnancy?

Called also *pseudocyesis*, is a condition in which some of the symptoms of pregnancy are present, especially enlargement of the abdomen, changes in the breasts, and *subjective* feeling of the fetal movements, the woman not being pregnant. It is to be distinguished from *feigned* pregnancy.

How may it be disposed of?

A vaginal examination shows the womb to be not enlarged, and the administration of ether will cause the abdominal enlargement to suddenly disappear, when not due to increase of fat in the abdominal walls. No fetal heart-sounds can be heard, the fetal movements cannot be felt, nor can the child be outlined by palpation. It sometimes terminates in spurious labor, a condition in which the clinical phenomena of labor are present in some degree.

What changes are due indirectly to the development of the womb?

Lines from distention, a median brown line, the cessation of menstruation, contractions of the uterine walls, and certain changes in the breasts.

Are these signs found only in pregnancy?

Each one of them is found to accompany other conditions, but when all or many of them are present, they furnish strong presumptive proof.

What are lines from distention?

Called also *lineæ albicantes;* they are small patches of shining tissue, whiter than the surrounding skin, found on the lower part of the abdomen, especially in the iliac regions, upon the flanks, thighs, and sometimes upon the breasts. They look like small "gores" inserted in the skin, or like cicatricial tissue. Their average size 1 inch long and 1/4 inch broad.

Are they due to distention or stretching of the skin?

Being found on the thighs, and also in young girls with rapid development of the hips, they are probably due only to rapid growth of the skin. They rarely disappear, and are, therefore, only of value in a first pregnancy.

What is the median brown line?

A narrow, brownish, discoloration of the abdominal skin, extending from the symphysis to the ensiform appendix, in the median line, and of little value as a sign of pregnancy.

Is menstruation always suspended by pregnancy?

In the great majority of cases. Some women continue to menstruate for a month or for several months; a very few menstruate throughout pregnancy; a few cases are recorded in which the women menstruated only when pregnant. As the decidua reflexa is not usually united to the vera for the first three months, there *may* be a menstrual hemorrhage from the womb during that time; but it is probable that any bloody discharge from the genital tract after the first month of pregnancy is not a true menstruation, but a hemorrhage, and an indication of threatening abortion. The real reason for the cessation of menstruation is the effect which fecundation produces upon the system.

Is menstruation stopped by other things than pregnancy?

If often ceases after a few months in newly married women, and may be stopped for one or more periods by mental emotion, change of climate, especially if following a sea voyage, acute or chronic disease, and especially phthisis.

What is meant by contraction of the uterus during pregnancy?

The walls of the uterus are always in a state of intermittent contraction. Hence the hand of the physician placed on the abdomen of a woman may detect them (the womb becoming harder) every twenty or thirty minutes (Braxton Hick's sign).

What changes occur in the breasts?

1. They may become enlarged.
2. Pain or discomfort may be felt.
3. They may contain milk, which can be pressed from the nipple.
4. The nipple and areola become darker (sometimes almost black).
5. A circular ring of dark splotches may be developed at a short distance from the areola, called the secondary areola, developed after the fifth month.
6. The sebaceous follicles about the areola become enlarged and contain sebaceous matter.
7. Lineæ albicantes may appear on them.

One or more of these changes are *always* present in pregnancy, though any of them may occur in other conditions. Their *presence*, therefore, is of less importance than their *absence*, in settling a diagnosis.

Which of the signs of pregnancy are certain signs?

Those due to the presence of the fetus, and of these but two are absolutely certain, viz.: the sound of the fetal heart, and outlining the fetus by palpation. Except in the very rare instances before mentioned, the peculiar feeling caused by the impact of the fetal parts against the abdominal wall can be counted among the positive signs of pregnancy.

Which of the presumptive signs are the most important?

The cessation of menstruation; the regular and symmetrical development of the uterus; the changes in the breast; morning sickness, and quickening.

At what date are the important signs available?

1. The fetal heart, rarely before the fourth month. They cannot be heard with any certainty before the sixth month.
2. Ballottement, third to fifth month, but its failure may be due to want of skill and other causes.
3. The cessation of menstruation, usually after the time for the first period, or immediate. Amenorrhea is always a suspicious circumstance in *healthy* women, *previously regular*, whether married or not, when not accompanied by ill health in some form.
4. The increased size of the uterus may almost always be made out by bimanual touch, at from four to six weeks. If at a second examination, a month later, a further symmetrical enlargement,

at the usual rate, is noted, the fact of pregnancy is scarcely to be doubted.

What are the signs due to the presence of a fetus?

1. The sounds of the fetal heart.
2. Fetal movements.
3. Fetal parts found on palpation.
4. The utero-placental souffle.
5. The funic souffle, and
6. Ballottement.

What is meant by the fetal heart-sounds ?

At any time during the latter half of pregnancy, the beating of the fetal heart may be heard by placing the ear (or stethoscope) over the abdomen of the mother, the heart sounds being distinguished from the maternal cardiac pulsations by differences of rhythm.

What does the sound resemble?

The ticking of a watch under the pillow, with a rate of 115–160 pulsations per minute.

Where and when are heart-sounds best heard?

When at the earliest period (about the fourth month) at which the heart-sounds are audible they are best heard over the fundus uteri; after that time the point of maximum intensity varies with the position and presentation.

Where are they best heard in the various presentations?

The abdomen being divided into four parts or quadrants by two imaginary lines, one extending from the ensiform cartilage to the pubes, the other, the transverse, dividing the uterus into two equal parts; in vertex presentations the heart-sounds are best heard below the transverse and to the right or left of the perpendicular line.

In Face presentations, on the transverse, and to the left or right of the perpendicular line.

In Breech presentations, usually to the left or right of the central line and somewhat higher than the corresponding vertex presentation would be.

In Shoulder presentations the heart-sounds are usually heard at or near the perpendicular line.

What are the fetal movements?

The fetus moves about freely, and strikes out with feet and hands against the uterine wall. If the hand of the observer is placed against the mother's abdomen, these slight blows may be felt. If not felt at once, they may sometimes be produced by wetting the hand in cold water and applying it suddenly to the abdomen. This causes contraction of the uterus, which inconveniences the fetus and causes it to make demonstrations.

When can the fetal movements be first felt?

Not until after the fourth month, or until the uterine and abdominal walls have come in contact.

Can the fetal movements be simulated by anything else?

Some women have the power to contract their abdominal muscles suddenly and irregularly, so as to simulate the fetal movements. Such instances are rare. Women often imagine they feel the fetal movements, when in reality they are not pregnant at all.

What is palpation?

This consists in gentle manual pressure made with both hands for the purpose of ascertaining the position of the fetus in utero.

How is palpation performed?

The woman, after having her bladder emptied and the rectum thoroughly evacuated either by an enema or purgative, lies on a bed with limbs extended, the abdomen being covered only by a sheet. The physician, standing at the side of the bed, places his hands with the palms together, the ulnar side down, the finger tips being immediately above the mons veneris. The hands are now gradually separated and passed upward along the abdomen, gently pressing and outlining the fetus between them.

How are the different fetal parts recognized by palpation?

The head can be recognized as a hard globe, more or less movable; the breech as a larger, less movable, body, at some distance from the head; in its neighborhood small movable bodies, the feet, can be felt. Between the head and breech a ridge, hard and little movable, can be made out; this is the back of the fetus.

What is the utero-placental souffle?

A bruit or whirring sound synchronous with the mother's pulse, which may sometimes be heard in the abdomen. It is variously

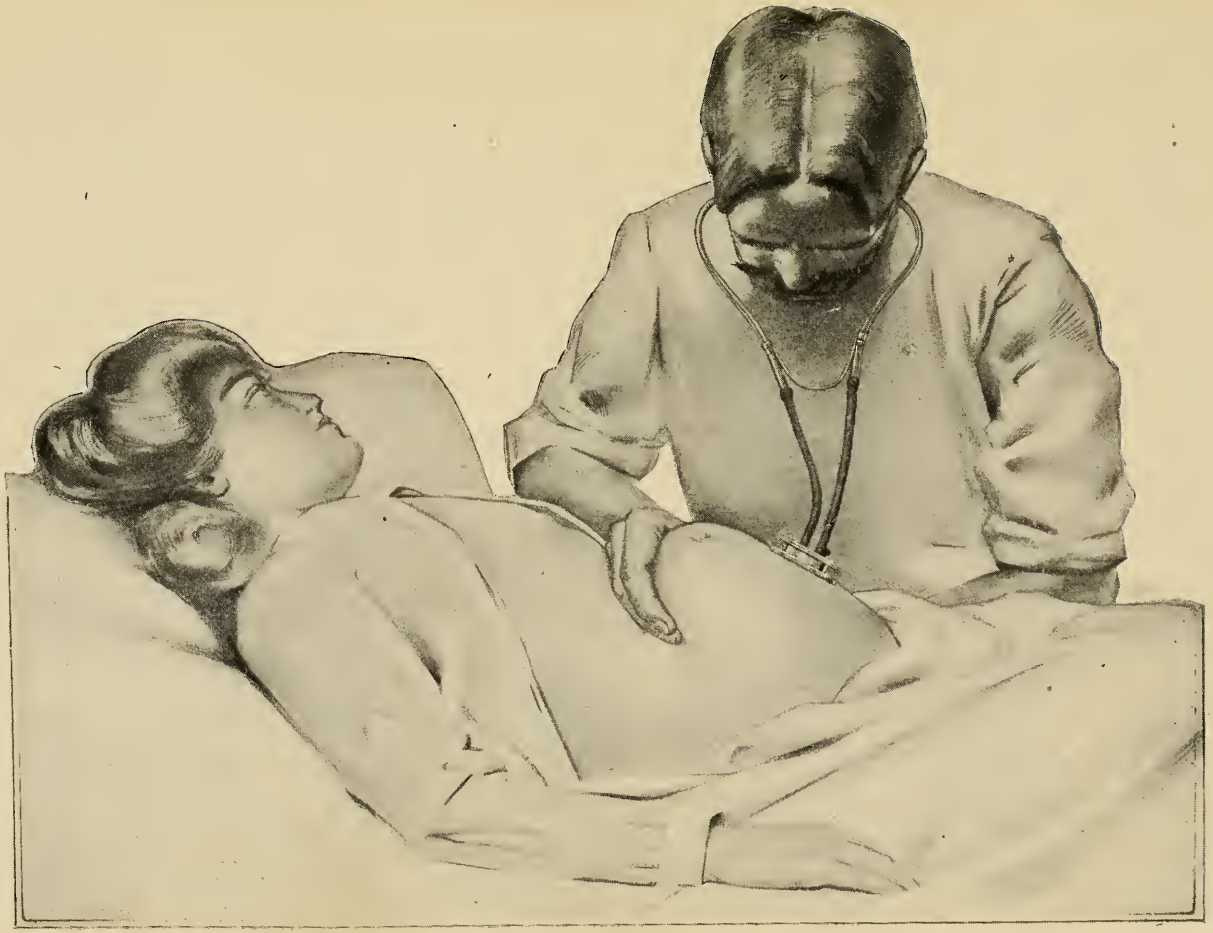

FIG. 40.—LOCATING THE FETAL HEART-SOUNDS BY AUSCULTATION.—(*Edgar.*)

supposed to be produced in the uterine sinuses, the placental circulation, the uterine or hypogastric arteries, and elsewhere. It is heard also in some fibroid tumors. It is of little use as a positive sign of pregnancy.

What is the funic souffle?

A similar but less intense bruit, synchronous with the fetal heart, and supposed to be produced in the vessels of the funis. It is rarely heard.

What is ballottement?

If, when the woman is in the erect posture, a finger (introduced into the vagina) is pushed suddenly against the anterior wall of the womb, the fetus, if present, will first be pushed up into the liquor amnii, and will then drop back. If the finger is held in position, the return of the fetus to its resting place may be felt and recognized. The manœuver is called ballottement, and may be practised between the third and fifth months, inclusive.

What is quickening or "feeling life"?

The time at which the mother first feels the fetal movements. The escape of the uterus from the pelvis (which is a requisite for feeling the movements) is sometimes sudden, and attended by peculiar sensations and faintness. It occurs about the 16th to the 18th week of pregnancy.

What is the duration of pregnancy?

It is somewhat variable, but is sufficiently accurate to regard as continuing through ten menstrual periods, ten lunar months, or 280 days.

What are the limits of variation?

From 245 to 300 days, with possibilities in either direction.

What method is usually employed to calculate the duration?

Count nine calendar months forward (or three backward) from the date of the last menstruation; add to this seven days. Ex.: End of menstruation, January 10th; three months back = October 10th; add seven days = October 17th, as the *probable* date of confinement.

What causes pregnancy to come to an end?

The important theories are—

1. Power's. The uterus is a peristaltic tube, with circular fibers in

the cervix acting as a sphincter. As the child grows it presses upon this sphincter, and the sum of all successive irritations finally causes it to relax, and the uterus to expel the child.

2. King's. The uterus has a definite limit of growth. The fetus does not attain its limit of growth *in utero*, and therefore distends the uterus when the latter stops growing. This irritates the uterine fiber and causes it to contract and expel its contents.
3. The foreign body theory. The womb is always irritated into contracting upon a foreign body, and the fetus becomes such a body at the end of pregnancy. There is probably truth in each view of the matter.

Why is the ovum not a foreign body during pregnancy?

Because of the intimate vascular connections between the chorion and the uterine mucous membrane.

How does the ovum become a foreign body?

By the fatty degeneration and atrophy of the connections between the ovum and uterus, which occur during the last weeks of pregnancy.

What effect has this upon the uterus?

It causes a gradually increasing irritation of the muscular fibers, contractions are excited sufficiently powerful to expel the child.

LABOR

What is labor?

The process by which the child and its ovular attachments are expelled from the womb.

What changes take place in the female organism immediately before labor begins?

1. Owing to the descent of the presenting part, *the uterus sinks lower in the pelvis*. The abdomen then becomes somewhat smaller, respiration less difficult, and by a decrease of pressure on the stomach, digestion may be improved. The bladder is now pressed upon, producing irritability, walking is more difficult, and there is apt to be edema of the lower limbs. This sinking of the uterus is more common in primiparæ.
2. *Hypersecretion of the cervical glands*. A secretion of thick glairy mucus is produced by the cervical glands. Later, owing to the partial detachment of the decidua and consequent slight hemor-

rhage, this secretion becomes tinged with blood, and in common language is spoken of as "a show."

3. The *labia at this time are apt to be somewhat separated*, the secretions of the vaginal glands are increased, and relaxation takes place in its walls.

What essential steps occur in labor?

1. The body or expulsive portion of the uterus contracts.
2. The enlargement of the os uteri until it is of a size sufficient to permit the passage of the child. There is also dilatation of the cervix and vagina, thus making the birth canal a tube or canal bounded above by the fundus uteri and below by the vulva. This is sometimes spoken of as the *canalization* of the birth canal.
3. The expulsion of the child.
4. The expulsion of the placenta and membranes, also called the after-birth, or secundines.

Into how many steps is labor divided?

Into three. I. The stage of dilatation and canalization of the birth canal.
II. The stage of expulsion of the child.
III. The stage of expulsion of the after-birth or placenta.

By what force are these occurrences produced?

By the contraction of the uterus, aided by the abdominal muscles.

What are the contractions of the uterus called?

Labor-pains, because usually accompanied by painful sensations in the back or hypogastrium.

What are painless uterine contractions?

These are contractions of the uterine muscle felt by placing the hand upon the abdomen, and are found in the last period of pregnancy. They are not of sufficient force to excite the pain sense.

What symptoms are of the greatest importance in showing that labor has actually begun?

Regular uterine contractions, accompanied by the dilatation and effacement of the cervix.

How long does a contraction last?

Each contraction lasts for from a few seconds to two minutes. Their duration increases with the progress of the labor, becoming

longer and stronger as it advances. The average duration is a little more than one minute (according to Westermarck, about 69 seconds).

How long is the interval between them?

At the beginning of labor they are from a half hour to ten minutes apart. The interval diminishes as labor advances, and toward the end may be from five minutes to only one minute apart.

What effect have the contractions upon other muscles?

When powerful, or when the second stage is half finished, they are accompanied by contractions of the abdominal muscles which are almost entirely involuntary, and the woman strains or "bears down." The muscles of the extremities also become rigid during the expulsive effort.

How much pain accompanies a uterine contraction?

In an entirely normal labor in a healthy woman the pain is slight; in any case, during a bearing-down effort, the consequent cerebral fulness causes some physiological anesthesia. In perhaps the majority of labors there is some abnormal condition present which makes the contractions inconveniently painful.

What are the characters of the pains at each stage?

During the *first stage of labor* the patient usually speaks of the pains as being in the back, in the lumbo-sacral region, and of a grinding character. They frequently extend down to the pubes.

In the second stage the pains are more intense, and are spoken of as "bearing-down pains;" they are referred to the lower part of the abdomen and vagina. Cramps occur in the legs. The woman often complains of sensations of tearing and stretching of the vaginal and perineal tissues. At the end of this stage the uterine contractions become entirely involuntary.

How is the dilatation of the os effected?

1. The simultaneous contraction of all the uterine muscular fibers tends to pull apart the edges of the os, since there alone the fibers are absent.
2. The uterus is longer than broad, and its longitudinal fibers more numerous than the others; therefore, during a contraction it tends to become broader than long, which forces the contents of the uterus against the os.

3. The circular fibers about the os undergo a spontaneous dilatation, and this appears to be increased by the free secretion of mucus from the cervical glands.

What effect upon the contents of the uterus may be noticed during a contraction?

The force tends to move all the contents (child and liquor amnii) toward the os uteri; but fluids being more movable than solids, the liquor amnii is forced toward the os, while the child is driven away or recedes from it.

What is the bag of waters, and how formed?

The gradual distention of the membranes by the liquor amnii, which is forced in advance of the child, forms a bag filled with fluid in the os uteri. This becomes tense during a pain and relaxed during the intervals, and by its even pressure greatly aids in the dilating process.

Is the bag of waters always formed in labor, and what variations occur?

1. Sometimes the amount of liquor amnii is so small that no bag forms.
2. The membranes may rupture prematurely, and thus prevent it.
3. The membranes may be so greatly distended that the bag of waters reaches to the vulva. Usually it contains only a few ounces of fluid.

Of what service is the bag of waters after the os is fully dilated?

Of none; and the progress of the labor is suspended until the contractions are powerful enough to rupture the membranes and permit the escape of the liquor amnii.

What practical deduction follows from this?

That the physician should rupture the membranes as soon as the os is fully dilated.

How is expulsion of the child effected?

By the contractions of the uterus aided by the contraction of the abdominal muscles, and according to a definite mechanism, depending upon the manner in which the child is placed.

How is the after-birth expelled?

Theoretically, the placenta becomes folded longitudinally, ground

off the uterine walls by contractions, and then expelled. If nature does not do this in a short time, it is best to deliver the placenta by manual means. The expulsion usually takes place in from ten to fifteen minutes after the birth of the child.

What is the best method of delivering the placenta?

The method of Credé, so called after its chief promulgator.

1. Place the hand upon the lower part of the abdomen and rub, stroke, or knead the uterus. This will cause the womb to contract energetically, and in so doing to descend and move forward. Then—
2. Grasp the uterus through the abdominal walls, with one or both hands, and *squeeze* the placenta from it. If successful, the escape of the placenta may be recognized, and the latter will be found at the vulva, or even shot out into the bed. If not, wait a few minutes and repeat both manœuvers. If the placenta is dislodged as far as the vulva, remove it, taking care to twist the membranes into a rope, by rotating the placenta, in order to avoid leaving any strips behind. *Never pull upon the umbilical cord.*

What other advantages has this method?

It secures complete contraction of the uterus, and empties the uterine sinuses, preventing hemorrhage, inversion of the womb, uterine thrombosis, and almost all other complications.

What is the normal duration of labor?

It is variable. Collins, in over 16,000 cases, found that 84 per cent. completed labor within six hours or less. It is probable that in strictly normal cases of multiparæ three or four hours should suffice for the stage of dilatation or first stage, one hour for the second stage, and ten to thirty minutes in subsequent labors. The third stage, being artificial, is terminated at the will of the physician, and should rarely be delayed longer than ten or fifteen minutes. The average duration in primiparæ is from ten to fifteen hours.

Define the terms primipara, multipara, etc.

A woman in her first pregnancy and labor is called a *primipara;* in subsequent labors a *multipara*, or, if greater accuracy is required, the number may be given thus: 2 para, 3 para, etc.; one who has had one child, and is not now pregnant, is called a *unipara;* a woman who is not a virgin, but who has never had a child, is called a *nulli-*

para. Adjectives are formed from these words, as, a primiparous woman, etc.

Why is labor longer in primiparæ than in multiparæ?

Very commonly labor comes on from one to three weeks earlier in primiparæ; consequently the changes in the cervical canal are not as far advanced, and dilatation is slower than in multiparæ.

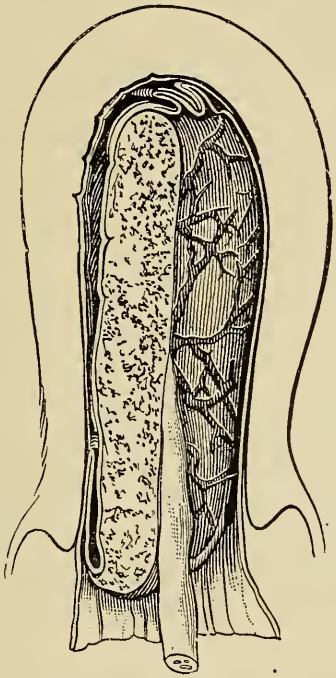

FIG. 41.

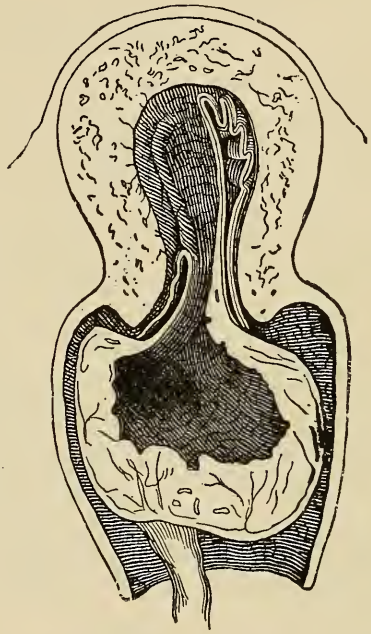

FIG. 42.

MANNER IN WHICH PLACENTA IS EXPELLED.

During the second stage the vagina and external parts of the primipara dilate more slowly, and thus occupy a longer time.

What foundation is there for the statement that a woman who conceives late in life will have a difficult labor?

An old primipara is apt to have, first, some inflammatory trouble of the cervix, leading to difficulty and delay in the first stage, and, second, to have an unyielding sacro-coccygeal or pubic joint, delaying the second stage. Otherwise there is nothing to cause a difficult labor in these cases.

What are the ordinary duties of the physician in the first stage of normal labor?

During the first stage, the physician should see that his patient has a room as comfortable as possible, one that is light, well ventilated, does not open directly into a water-closet, or where sewer gas can gain access. If possible there should be an open fireplace in the lying-in room. Labor having begun, he should see that the patient is given a bath, her hair neatly braided, that she is clad lightly and in a manner giving sufficient warmth. A short night dress is best, as it does not become soiled during the delivery. The patient's bowels should be well opened by an enema of glycerin and water or soap and water, and care should be taken to see that no urine is in the bladder. If urination cannot take place spontaneously, it must be drawn off by a catheter. The thighs, abdomen, and external genitals should be thoroughly washed with soap and water, followed by one of the antiseptics before named. The hair about the pubic region should be shaved off or at least clipped short. Following the cleansing the patient should wear a sterile vulvar pad kept in place by a *T* binder. If there has previously been a vaginal discharge during pregnancy the vagina may be swabbed out with green soap followed by a copious douche of bichlorid 1:5,000, lysol 2 per cent. or salt solution. In a case with no vaginal discharge douches should not be used. Before proceeding to the vaginal examination, the fetus may be outlined by external palpation. As few internal examinations as possible should be made. It is well to have the patient walking about during this stage. Simple food may be allowed.

How should the hands of the obstetrician be prepared before examining a woman?

The hands and arms to the elbow should be first washed thoroughly with soap and warm water, then rinsed in clear sterile water; secondly in a solution of bichlorid of mercury 1:2000, creolin 2 per cent., or other equally efficient antiseptic solution. The obstetrician should carefully scrub his hands and nails with a nail brush while using both the soap and water and the antiseptic solution. Sterilized rubber gauntlet gloves are frequently employed to cover the hands. The obstetrician should not go directly from a post-mortem or any case of contagious disease to the lying-in room.

How should an examination be made?

Place the patient on her back, with the knees drawn up, or on her side with her face turned from the examiner. Anoint the index and middle fingers with fresh sterile vaselin, and introduce into the vagina, passing the hand under the thigh until the vulva is reached. Introduce the index finger alone at first; if necessary, the middle finger may be added, which will give an additional reach of about 1 inch.

What should be learned from the first examination?

1. If the woman is pregnant.
2. If she is in labor.
3. The condition of the os uteri, as to dilatation and dilatability.
4. The state of the membranes, and existence or not of a bag of waters.
5. The presentation and position of the child.
6. The condition of the soft parts generally, as to temperature, moisture, and dilatability.
7. The size of the pelvis.

How frequently should examinations be made?

Often enough to keep informed as to the progress of the labor. As this will vary greatly in different cases, no rule can be made. Usually, it is proper to examine every hour during the first stage. Meantime the physician need not be in the room, unless to encourage the patient; but may be in an adjoining room, or even absent himself from the house. When the second stage begins, his place is by the bedside. If progress is slow, examination may be made as in the first stage; if rapid, the finger placed on the perineum during a pain will warn him as to the approach of the end.

How should the bed be prepared?

If a bed can be particularly selected, it should be narrow and not too low. It should be so placed as to allow easy access from both sides. The bedding should consist of a hair mattress or a straw paillasse. Feather beds should not be used over the mattress. The mattress should be covered by a rubber sheet pinned down at the four corners and over this a sterilized sheet. On the sheet and under the woman's hips should be placed a pad composed of cotton batting or nursery cloth or clean paper covered

with sterilized cheese cloth. Many obstetricians use a Kelly's pad. After the labor the Kelley's pad and the pad under it are removed and a clean gauze-covered pad is placed upon the mattress, under the patient, to prevent the bed from being soiled by the discharges.

When should the woman be placed in bed?

There is no special need until the os is nearly dilated, unless the labor is tedious, when her strength will be conserved by lying down and keeping quiet.

What preparations should be made for the infant?

Its clothing should be made ready and aired. Several ligatures for the funis and a pair of scissors should be provided. Both hot and cold boiled water should be in readiness.

What hygienic measures are to be carried out?

1. To see that the bowels are moved by an enema, if there has not been a recent passage.
2. To require the woman to urinate occasionally.
3. If thirsty, give her water to drink.
4. See that the room is properly ventilated.
5. If there is any deviation from the normal course of labor, ascertain and remove it by appropriate treatment.

What things are to be prevented?

Crowding the room by unnecessary company. Meddlesome practices of old women, such as giving "teas," and in general anything that will disturb the woman, mentally or physically.

What objections to giving anesthetics to make the labor painless are urged by those who oppose this practice?

1. The pain is not great, unless some abnormal condition is present, which should be sought for and treated.
2. Natural labor lasts but a short time.
3. Anesthetics protract the labor.
4. They increase the risk of post-partum hemorrhage.
5. From the same cause (imperfect contraction of the womb) they increase the liability to all the puerperal diseases.
6. They endanger the child's life (especially chloroform).

How are these objections met by the advocates of obstetric anesthesia?

1. The proper administration of an anesthetic during labor renders

the act painless, and prevents the exhaustion which may follow the protracted suffering, often severe.

2. It is not proved that, when properly administered, they protract the labor or increase the risk of hemorrhage, and even granting the latter objection, this risk can be overcome by careful management of the third stage of labor and the use of ergot.
3. If rightly administered in suitable cases, the danger to the mother and child is not increased.
4. It prevents the sudden expulsion of the child and consequent violent tearing of the perineum.

When may an anesthetic be used in normal labor?

During the second stage of labor, when the pain is severe, as when the head is passing through the os uteri or vulval orifice, provided no condition exists which would be considered a contraindication to etherization for surgical purposes, and provided the uterine contractions are of normal intensity.

How should an anesthetic be given?

As the object in view is to deaden the pain, not to produce unconsciousness, the ether or chloroform should be given in small quantities, inhaled only during the pains and withdrawn in the intervals between them. In the last stage of labor, while the fetal head is passing over the perineum, it is generally best to increase the amount of anesthetic producing for a moment complete unconsciousness.

What anesthetic is to be preferred?

1. Chloroform is most generally used, because it is quicker in its action, more pleasant to take, and less is required to produce the effect for which it was given nitrous oxid is also occasionally used.
2. Ether is probably safer, and appears to be less likely to enfeeble uterine contractions.

What disturbances often attend the end of the first stage?

1. The woman is very apt to vomit, which relaxes and prepares the soft parts and increases the uterine contractions.
2. A rigor sometimes occurs, temporarily suspending labor, but with hot applications to the feet and a hot drink, it usually speedily ceases.

What duties are required during the second stage?

1. To rupture the membranes, if this does not occur spontaneously.

2. To observe the descent of the child, and to be ready to remedy any departure from the normal course.
3. To prevent the laceration of the perineum.
4. To complete the delivery of the child.

How should the patient be treated during this stage?

It is best that she should be in bed and covered only by a sheet or blanket during the entire second stage. She should lie on her side with her back toward the attending physician, her night dress well drawn up under the arms. A nurse should support the upper thigh, or a stout pillow may be placed between the knees. A sheet might well be attached to the head of the bed and given to her to pull upon during a pain. The lateral position makes perineal rupture more difficult and makes the examination much easier. Vaginal examinations will be more frequently necessary in the second stage than during the first; they should be made often enough to follow accurately the position of the presenting part in its course along the birth canal.

How are the membranes to be ruptured?

By pressing the finger against them while they are made tense by a contraction. If they are too thick and strong to yield to this, the nail of the middle finger may be prepared as follows: First, make a straight cut in the free border of the nail and in the middle line of the finger. Second, pare away the free border on one side of the cut, which will have a sharp, knife-like edge.

If the bag of waters is large, it is well to place pads of sterile cheese cloth or well boiled old linen, etc., in front of the vulva before rupturing, in order to soak up the liquor amnii when discharged.

What occurrences often attend the end of the second stage?

1. The woman has a sensation of wanting to move the bowels frequently and will ask to sit up or to be placed on a commode. This feeling is caused by the pressure of the child's head on the bowel. Of course, she is not to be allowed to sit up at this time.
2. Cramps in the leg often occur from pressure of the descending head against the sciatic nerve. Rubbing the leg affords relief.

How is the perineum to be guarded?

The obstetrician, sitting beside the patient, should have before him a basin containing a solution of bichlorid of mercury 1:5000, or other efficient antiseptic solution, in which small pieces of cotton

or gauze have been placed. With one hand under the upper thigh, he, with the thumb on the occiput and the fingers on the anterior part of the fetal head, guides it away from the perineum or holds it back during a pain; the other hand, placed against the perineum, should gently and steadily press from the sides toward the center and upward toward the symphysis; or by bringing out the head in the absence of a pain, if possible. When the head gently distends the perineum and a part of the occiput protrudes, pass two fingers into the rectum, and place them on the brow, malar bones, or chin of the child, as may be convenient. Place the thumb on the occiput. The head may then be controlled and prevented from passing through the vulva during a pain. If, when a pain has subsided, the head be now pushed over the perineum, laceration will be prevented. It is also necessary that the woman shall not bear down at this time. Anesthesia should be complete as the head passes over the perineum.

What is episiotomy?

An operation designed to save the perineum, by making small incisions into its margin, on either side of the median line.

What is to be done when the head is born?

1. Ascertain if the funis is around the child's neck, and, if so, unwind it.
2. If no uterine contraction appears to be forthcoming pass a finger into the vagina, below the child's neck, and, hooking it into the posterior axilla, withdraw the child, taking care that the shoulders do not lacerate the perineum.

What is the first attention to be rendered to the child?

1. Pass a finger covered by sterile gauze into its mouth to remove any mucus which may be there.
2. It if does not at once cry, let it hang head downward for a moment; give it a slight spank on the buttocks, dash a small quantity of cold water on it; all mucus should be carefully removed from the child's mouth by small pieces of gauze dipped in a saturated solution of boric acid, or use other means of resuscitation until it gives a good cry.
3. When it has cried well, tie the cord.

How is the cord tied?

A ligature of several strands of sewing thread or other material should be tied two or three finger-breadths from the child's navel. A second ligature should be applied several inches from this, and the cord cut between the ligatures with scissors. If there is much Whar-

ton's gelatin in the cord, it is well to hold it firmly at the navel, and endeavor with the finger and thumb to squeeze out the gelatin or "strip" the cord. After cutting the cord see that the ligature is firm, and that no blood is escaping, and hand the child to the nurse.

How is the cord to be dressed?

The physician is usually expected to dress the stump of the cord attached to the child. Take a piece of aseptic gauze, about 4 inches square; cut a hole in the middle large enough for the cord to pass through; slip it over the stump and fold it so as to thoroughly cover it. It is a good practice to dust the cord stump with an aseptic powder, such as salicylic acid ℥ss, boracic acid ℥j.

What attentions are to be rendered to the woman?

1. The placenta is to be delivered after the method of Credé (*vide* p. 106).
2. An inter-vaginal douche of one gallon of solution of bichloride of mercury 1:5000, creolin or lysol 1 per cent., normal salt solution other antiseptic solutions should be given.
3. The soiled clothing is to be removed and a sterile pad placed at the vulva to receive the discharges.
4. A broad bandage or "binder" should be applied around the abdomen.
5. The uterus should occasionally be felt through the abdominal walls, to be sure it remains contracted.

What is the position of the womb after delivery?

Just after the delivery of the placenta the womb should be in the hypogastrium, its fundus reaching half way to the umbilicus, and feeling as hard as stone. In a short time (generally within the hour), the abdominal muscles regain their tonicity, and the "retentive power of the abdomen" draws the womb upward, its fundus reaching nearly or quite to the umbilicus.

Why does a rigor often occur just after labor?

1. The bedding and clothes are apt to be wet with the discharges.
2. The withdrawal of the child takes away a source of bodily heat, its temperature being nearly a degree higher than that of the mother.

When may the physician leave, and when should he return?

He may leave within half an hour, if the woman has been cared for as above, and is in good condition. He should return within

from twelve to twenty-four hours; and in general those who watch their patients best will have the least trouble.

What should a physician carry with him in attending an obstetric case?

A physician's obstetric bag should contain the following:

1. A good copper sterilizer, either nickel plated or plain, and this may conveniently be arranged in two divisions, one fitting into the other, and acting as a lid. When open and in use one has thereby two sterilizers in which the instrument may be laid out and sterilized by boiling.
2. One or preferably two pairs of obstetric forceps each with an axis traction attachment.
3. Two pairs of fairly long clamp forceps for clamping the umbilical cord. Special forceps are made for this purpose, but the ordinary broad ligament forceps will do very well.
4. Six pairs of hemostats.
5. Umbilical scissors.
6. Volsellum or double tenaculum forceps, and one pair uterine dressing forceps.
7. Curved needles of various sizes and a needle holder.
8. Silk-worm gut, chromic catgut and silk suture material.
9. Rubber apron, sterilized operating gown or an operating suit in a canvas bag.
10. Rubber gloves, sterilized.
11. Kelly pad.
12. Four-quart fountain syringe with proper vaginal douche tubes.
13. Nail brush, and soap.
14. Bichlorid of mercury tablets.
15. Catheters of rubber and glass.
16. Boric acid in powder.
17. Proper solution of silver nitrate for the child's eyes and an eye dropper.
18. Sterilized gauze in small packages.
19. Absorbent cotton.
20. Hypodermatic syringe and a good selection of tablets; strychnin, atropin, ergot, and morphia should always be included.
21. Tape for umbilical cord.
22. Small scales for weighing baby.
23. To this list may be added those instruments necessary for Cesarean section or craniotomy. (See articles on these subjects.)

24. Ether and chloroform.
25. One pair vaginal retractors.
26. Scalpel, tenaculum.
27. Saline transfusion apparatus.
28. Intra-uterine douche tube.

What articles should a woman prepare for herself before labor?

Three abdominal binders, 12 inches wide and 48 inches long, made from two thicknesses of good strong muslin.

Three breast binders about 8 inches wide, and long enough to go around the body on a level with the breasts.

One piece of rubber sheet or white oilcloth as wide as the bed and half as long.

Three pads as wide as the bed and half as long, made of four or five thicknesses of newspaper, clean old muslin, absorbent cotton or cotton lining covered with cheese cloth. Nursery cloth is most commonly used.

One fountain syringe, 2 quarts.

Two dozen vulvar pads, 10 inches long, 3 inches wide and 1 inch thick, made of cotton batting covered with cheese cloth. The covering must extend beyond the ends of the cotton for about 4 inches at each end. These, with the bed pads, must be rendered aseptic by soaking in a solution of bichlorid 1 : 1000, and drying in an oven or sterilizer or by sterilization with dry heat.

Several strips of clean old muslin.

One yard of sterile borated gauze in a sealed bottle.

One medium-sized roll of sterile absorbent cotton.

One dozen each of large and small safety pins.

A bottle of carbolized vaselin.

Some whisky or brandy; a quantity of hot and cold boiled water.

One bed pan.

What articles should be prepared for the child?

Four to 6 dozen diapers.*

Four to 6 pairs knit (woolen) socks.

Three or 4 woolen shirts.

Four flannel night shirts.
Four flannel day shirts.
Four to 6 white day skirts.
} Skirts to be made with waists instead of bands.

Six to 10 slips.

Six to 10 dresses.

* Hirst's "Text-book of Obstetrics."

Material for 4 or 5 flannel bands (45- to 50-cent flannel).
Soft pillow (good size 14 × 18 inches).
Soft pillow covers.
Knit wrapping blankets.
Sacques, wrappers, bibs, caps, blankets, veils, etc.

What directions would you give a nurse regarding the care of a patient after normal labor?

All directions should be given in writing.

Hirst's directions are as follows:

FOR THE MOTHER

The temperature should be taken thrice daily—morning, noon, and evening.

Vaginal douches should not be used after normal labor.

Place a pad of nursery cloth under the patient, changing it when soiled.

With aspetic hands, an occlusion bandage consisting of salicylated cotton and carbolized gauze should be made, and is to be changed every four hours for the first five days.

The external genitalia are to be washed off every five or six hours with a warm solution of corrosive sublimate 1:4000, using absorbent cotton for the purpose.

The bladder is to be emptied by the catheter three times a day if necessary.

The patient is to lie on her back; she may be moved from one side of the bed to the other several times a day; her limbs may be rubbed with alcohol and water or bathing whisky once a day.

The nurse's hands are to be washed with a nail-brush, soap, and water, and rinsed in a 1:3000 corrosive sublimate solution before catheterizing the patient or cleansing the genitals or breasts.

DIET:

First forty-eight hours.—One and one-half to two pints of milk a day, gruel soup, one cup of tea a day, toast and butter.

Second forty-eight hours.—Milk, toast, poached eggs, porridge soup, corn starch, wine-jelly, tapioca, small raw or stewed oysters, one cup of tea or coffee a day.

Third forty-eight hours.—Soup, mashed potatoes, white meat of fowl, beets, in addition to above.

After the sixth day return cautiously to ordinary diet. Three meals daily, meat of an easily digested character at one of them —white meat of fowl, tenderloin, etc.

Take a glass of milk at least three times a day before meals and before going to sleep at night; also a glass at midnight.

FOR THE CHILD

Rub the child well with sweet oil, and then wash it on the nurse's lap. The bath-tub may be used at the end of the first week, the water not being over 100° F.

Dress the cord with salicylated cotton. Look carefully if there is any bleeding. A dusting powder for the navel is salicylic acid 1 part and starch 5 parts.

The child should be bathed daily with water, Castile soap, and a soft sponge, in the warmest part of the room. Avoid the eyes.

Change diapers often. For chafing use cold cream and talcum powder.

The child is to be nursed at the breast every four hours for the first two days. No other food is to be given it.

After the second day it should be nursed every two hours, from 7 A. M. to 9 P. M., and twice during the night.

After every nursing the nipples are to be carefully dried and then smeared with a little sweet oil for the first week or two, applied with fresh pledgets of absorbent cotton.

What are after-pains?

The pain sometimes experienced after labor, due to the contractions of the uterus. They are rarely felt by primiparæ, and usually increase in severity with each subsequent labor. They may occur only a few times, or may keep up for several days. If severe enough to need treatment, opium and camphor, in powder or as in paregoric, will be the proper remedy.

What is the caput succedaneum?

An edematous swelling formed on the part of the presentation in advance, caused by the pressure upon the circulation in the presenting circumference by the grip of the cervix, vagina, and pelvic walls. It forms only when the head is arrested at any point for some time.

How long does it remain?

For several days after birth, if not interfered with.

THE MECHANISM OF LABOR

What is meant by the mechanism of labor?

The purely mechanical movements involved in the passage of the

child through the pelvis, in distinction to the vital and clinical conditions connected with the process.

With what is the mechanism of labor concerned?

With three things:

1. The body to be propelled.
2. The tube through which it is propelled, and
3. The propelling force.

What is the propelling or motive force in labor?

1. The contractions of the uterus, principally, aided by:
2. The contractions of the abdominal muscles.
3. The elastic resistance of the perineum.

When is the first or uterine force exerted?

Throughout the entire labor, and is the main and necessary force.

When is the second or abdominal force exerted?

It may be voluntarily exercised at any time, but usually is reflexly excited when the head is low in the pelvis becoming almost involuntary.

What effect has the abdominal force?

1. It aids the uterine force directly, by pushing the child onward, and—
2. Indirectly, by holding the womb down and preventing it from being pushed upward by the pelvic resistance to the passage of the child.

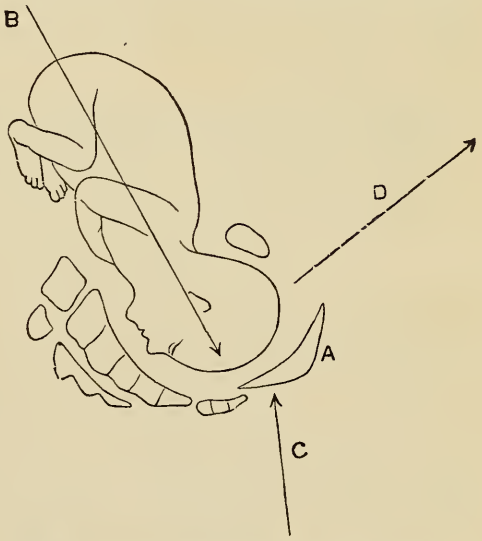

FIG. 43.—*A*. Perineum. *B*. The direction of the uterine force. *C*. The direction of the perineal force. *D*. The resultant of the two forces, in which the head moves.

When and how is the perineal force exerted?

After the child has reached the outlet, it can go no further without passing through or over the perineum. The uterine force is unable to propel it in any direction except against or through the perineum. A new force is therefore provided in the elastic resistance of the perineum, which tends to push the head back in *nearly* the opposite direction

(a little forward as well). Therefore the head moves in the resultant of the two forces, and *over* the perineum.

What form does the child assume in its intrauterine growth?

It is substantially an ovoid, or egg-shaped figure, the extremities being flexed and pressed against the trunk.

What relations may it assume to the pelvic inlet?

Either end (the head or breech) may be opposite the inlet, or it may lie transversely across it.

What is the presentation of the child?

The part of the child in advance, or, more accurately, that part of the child included within the circumference of the inlet at the beginning of labor.

How many presentations are there?

Four:

I. The *vertex.*
II. The face.
III. The *breech.*
IV. *Transverse.*

Which is the most common?

The vertex presents in over 90 per cent. of all labors.

What distinguishing marks exist upon the head?

I. Sutures. II. Fontanelles. III. Protuberances.

I. Sutures.

1. The *sagittal* suture and its continuation, the *bi-frontal*, extend antero-posteriorly between the parietal and frontal bones.
2. The *lambdoidal* suture extends from the posterior limit of the sagittal suture between the occipital and parietal bones, making a V-shaped line.
3. The *coronal* suture extends between the parietal and frontal bones, crossing the sagittal at right angles.

II. Fontanelles.

1. The *posterior fontanelle*, a small, triangular enlargement of the sutural membrane, at the junction of the sagittal and lambdoidal sutures.
2. The *anterior fontanelle*, a large quadrilateral enlargement of the sutural membrane, at the junction of the sagittal and coronal sutures.
3. The *postero-lateral fontanelles*, one on each side, at the inferior limits of the lambdoidal suture.

III. Protuberances.

1. The *parietal protuberances*, called also eminences or bosses, situated in the center of each parietal bone.
2. The *frontal* protuberances, situated at the sides of the frontal bones.
3. The *occipital* protuberance, situated in the center of the occipital bone.

What is the object of the sutures and fontanelles?

They admit of the mobility and overlapping of the bones, so as to diminish the size of the head in labor. Incidentally they furnish us with important "landmarks." The overlapping edge of bone is usually felt, rather than the suture itself.

What are the diameters and planes of the fetal head?

The diameters are lines drawn from one point to another; the planes are imaginary levels drawn transversely through different points of the head, each for the purpose of facilitating the description of the relation of the head to the pelvis in labor.

Name the diameters and planes.

Diameters.

1. The *occipito-mental* diameter, drawn from the highest point of the occiput to the point of the chin, and measures 5 1/4 inches, or 13 1/2 cm.
2. The *occipito-frontal*, from the occiput to the root of the nose, about 4 1/2 inches, or 11 1/2 cm.
3. *Sub-occipito-bregmatic*, drawn from the junction of the occiput with the neck to the point of intersection in the large fontanelle of the coronal and sagittal suture, 3 3/4 inches, or 9 1/2 cm.
4. *Fronto-mental* extends from the top of the forehead to the point of the chin, 3 1/4 inches, or 8 1/2 cm.
5. *Cervico-bregmatic*, from the middle of the large fontanelle to the upper part of the neck near the larynx, 3 3/4 inches, or 9 1/2 cm.
6. The *cervico-frontal* diameter, drawn from the apex of the forehead to the occipital ridge or nape of the neck, and measures a little less than 4 inches, or 4 — inches, or 10 cm.
7. The *bi-parietal* or transverse diameter, drawn from one parietal protuberance to the other, and measures 3 3/4 inches, or 9 1/2 cm.

8. *Bi-temporal*, between the extremities of the coronal sutures, 3 1/4 inches, or 8 1/2 cm.
9. *Bi-mastoid*, between the mastoid processes at the base of the skull, 3 inches, or 7 1/2 cm.

Planes.

1. The *occipito-frontal* plane, drawn transversely through the occipito-frontal diameter (or through the occipital and frontal protuberances); when the head is neither flexed nor extended (the body being erect), this plane is exactly horizontal (corresponds to the plane of the horizon).
2. The cervico-frontal plane, drawn transversely through the cervico-frontal diameter. When the head is *half flexed*, this plane is horizontal, and therefore may be called the plane of demi-flexion.
3. The cervico-bregmatic plane, drawn transversely through the cervico-bregmatic diameter. When the head is *completely* flexed, this plane is horizontal, and therefore may be called the plane of complete flexion.

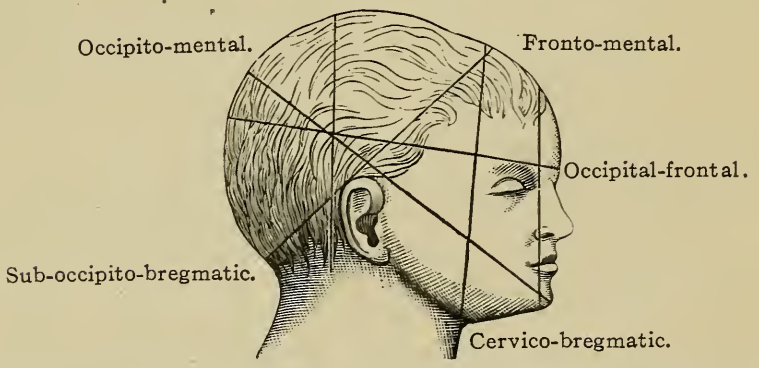

FIG. 44.—ANTERO-POSTERIOR AND VERTICAL DIAMETERS OF THE FETAL HEAD.—(*Tarnier.*)

What outline is intercepted by these planes?

In the occipito-frontal, an elliptical outline; long diameter 4 1/2 inches. Transverse diameter 3 3/4 inches.

In the cervico-frontal, an elliptical outline; long diameter 4 — inches. Transverse diameter 3 3/4 inches.

In the cervico-bregmatic, a circular outline; long diameter 3 3/4 inches. Transverse diameter 3 3/4 inches.

What important deduction may be drawn from these facts?

The more the head is *flexed*, the *smaller* is the outline presented.

What is the circumference of the fetal head?

The circumference of the head from the chin to the vertex, using the latter term to express the highest part of the skull, without reference to any fixed anatomical point, is about 14 3/4 inches, or 37 1/2 cm. The circumference at the sub-occipito-bregmatic diameter is but 13 inches, or 33 cm. (Lusk.)

Name the important diameters of the fetal trunk?

The bis-acromial 4.7 inches—about 12.75 cm. Is capable of compression. Bis-trochanteric, 3.5 inches, or 9 cm.

In how many ways may the vertex enter the pelvis?

The elliptical outline of the head may enter with the *occiput* in front and to the left or right, *i.e.*, in relation with the ilio-pectineal eminences of either side, and behind and to the right or left, *i.e.*, in relation with the sacro-iliac joint of either side. There are, therefore, four positions of the vertex, named as follows:

1. Left Occipito-Anterior.
2. Right Occipito-Anterior.
3. Right Occipito-Posterior.
4. Left Occipito-Posterior.

What is position?

Position is the relation which the presenting part of the fetus bears to the four cardinal points on the pelvic inlet, *i.e.*, the sacro-iliac joints and the pectineal eminences.

How many positions are there of the Face presentation?

Since the face has also an elliptical outline, with the *mentum* or chin at one end in relation with the sacro-iliac joints or ilio-pectineal eminences of either side, we have the same arrangement as in the vertex, or:

1. Left Mento-Anterior.
2. Right Mento-Anterior.
3. Right Mento-Posterior.
4. Left Mento-Posterior.

How many positions are there of the Breech presentation?

Since the breech has also an elliptical outline, with the *sacrum*

in a direct line with the occiput, we have the same arrangement as in the vertex, or:

1. Left Sacro-Anterior.
2. Right Sacro-Anterior.
3. Right Sacro-Posterior.
4. Left Sacro-Posterior.

How many positions are there of the Transverse presentation?

For the sake of uniformity we may assume an elliptical outline for the shoulder, with the *dorsum*, or back of the shoulder, as the name-point. This gives us the same arrangement as in the other presentations, or:

1. Left Dorso-Anterior.
2. Right Dorso-Anterior.
3. Right Dorso-Posterior.
4. Left Dorso-Posterior.

How may the positions be more briefly designated?

By initials, as L. O. A. for left occipito-anterior, R. S. P. for right sacro-posterior, and so on.

How may these sixteen positions be represented in a single scheme?

			Or by initials only.
Left	Occipito-Mento / Sacro-Dorso	Posterior.	L. O. M. S. D. A.
Right		Anterior.	R.
Right		Anterior.	R.
Left		Posterior.	L.

How is the head situated at the beginning of labor in the L. O. A. position?

The occiput points to the left ilio-pectineal eminence; the bi-frontal suture is opposite the right sacro-iliac symphysis, and the sagittal suture lies in the right oblique diameter.

How can a L. O. A. position be diagnosticated before labor?

By palpation the continuous curved line of the fetal back will be found on the left side and to the front of the mother's abdomen. Above will be recognized the breech, while just above the pubic bone the head can be felt as a ball with a constricted part, the neck just above it. The heart-sounds will be heard best midway on a line extending from the left ilio-pectineal eminence to the point of inter-

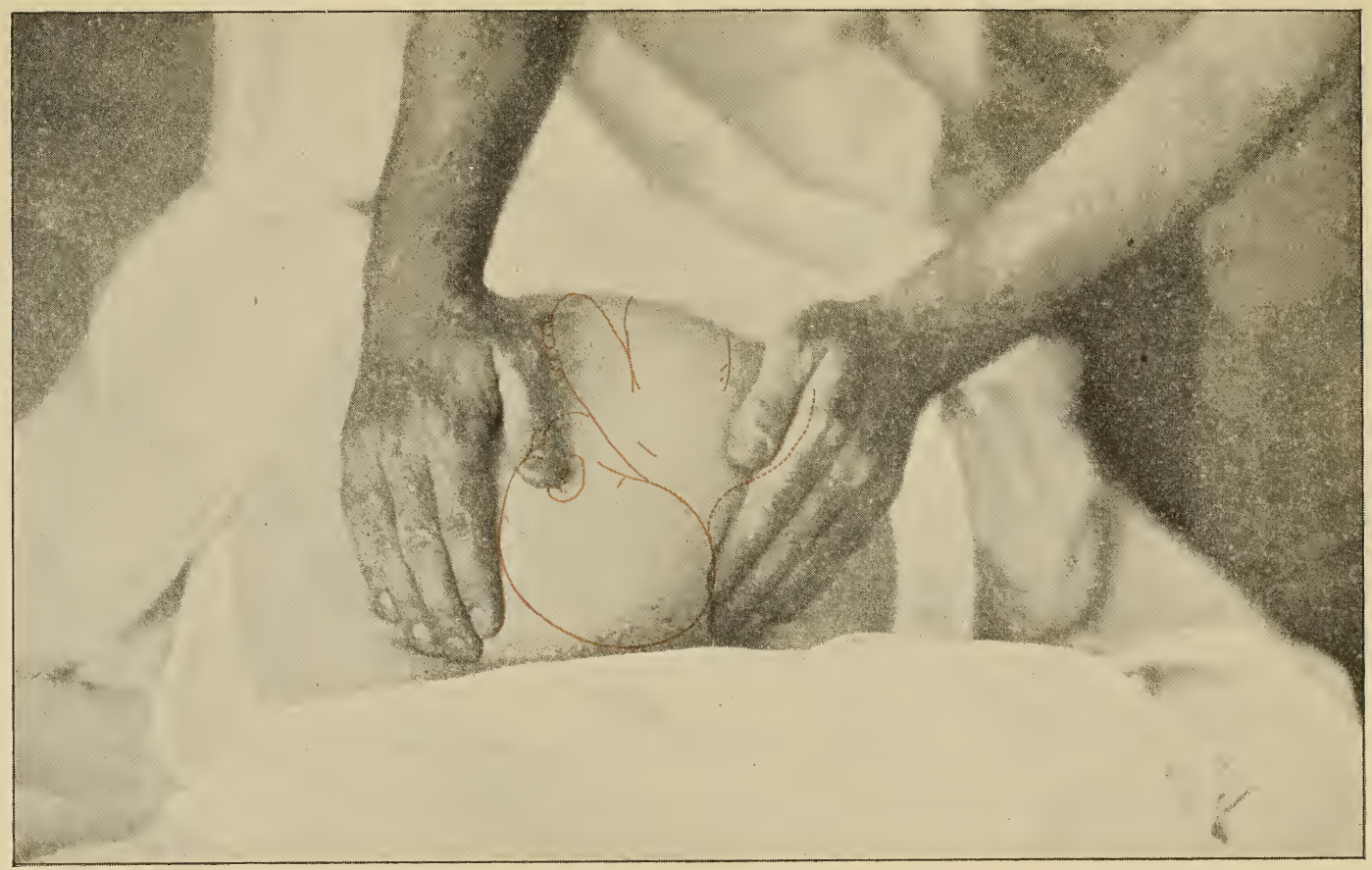

FIG. 45.—MANIPULATION, DETERMINING THE ENGAGEMENT OF THE FETAL HEAD. (*From Davis' "Manual of Obstetrics."*)

section of the perpendicular and transverse lines, or more simply the center of a line drawn from the umbilicus to the anterior-superior spine of the ilium on the left side; the left lower uterine quadrant.

What is the mechanism of delivery in the L. O. A. position?

1. *Flexion* occurs, whereby the cervico-frontal, or even the sub-occipito-bregmatic diameter, is substituted for the occipito-frontal,

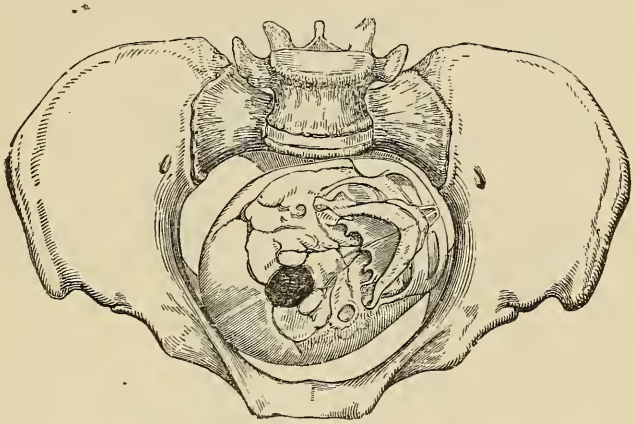

FIG. 46.—RIGHT OCCIPITO-ANTERIOR.

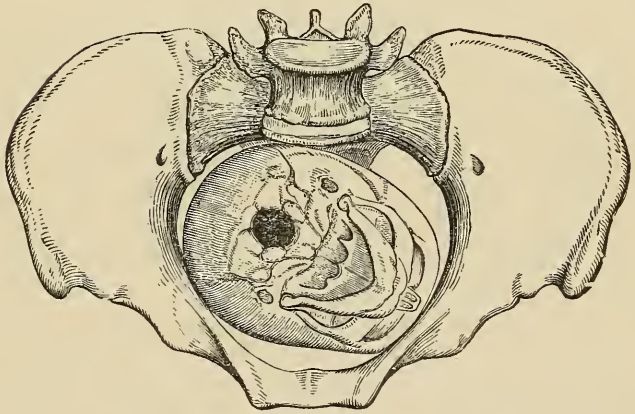

FIG. 47.—RIGHT OCCIPITO-POSTERIOR.

thus reducing the outline presenting in the pelvis. The head is strongly flexed in its relation to the body. It enters the pelvis usually in the right diagonal of the mother's pelvic inlet. Occasionally, however, the head may enter in the transverse, anterior rotation occurring after it passes the pelvic brim or superior strait.

2. The head *descends* in the pelvis, and at the same time a *leveling* movement occurs by which the forehead descends more rapidly than the occiput, and becomes level with it.
3. While the head descends it also *rotates*, so that the sagittal suture is finally brought into the median line or antero-posterior diameter;

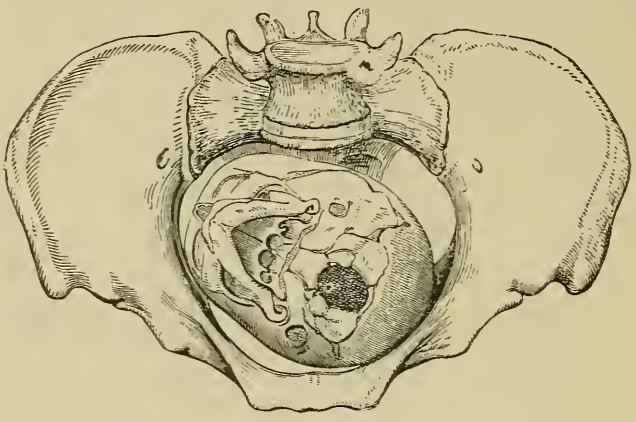

FIG. 48.—LEFT OCCIPITO-ANTERIOR.

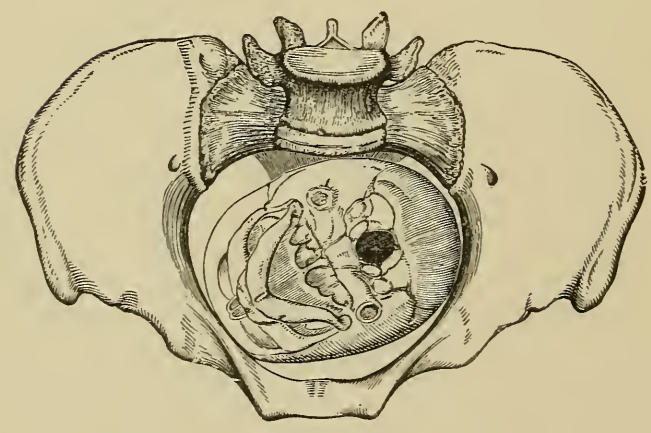

FIG. 49.—LEFT OCCIPITO-POSTERIOR.

first of the pelvic cavity, then of the outlet. By the time the head reaches the pelvic outlet, the shoulders engage in the left diagonal of the mothers inlet.
4. When the head reaches the outlet, the occiput or nape of the neck remains fixed under the sub-pubic arch, the uterine forces continu-

ing to force the child downward along the birth canal, the forehead and face sweep over the perineum by a movement of *extension.*

5. After the head is born it undergoes a movement of *external rotation,* or *restitution,* because the shoulders, entering the pelvic cavity in the left oblique or transverse diameter now come to the outlet. They now undergo a movement of *internal rotation,* so that the bisacromial diameter is finally brought into the median line or antero-posterior diameter, the right shoulder turning under the pubic symphysis the left sweeping over the perineum.
6. The trunk now pivots upon the arm just below the shoulder, and *the body* is delivered by a movement of lateral-flexion.

What variations occur in the mechanism of the L. O. A. position?

If there is not a close fit between the head and the pelvis there may be less flexion and rotation, but no substantial difference in the mechanism occurs. The shoulders may vary greatly, due usually to the length of the neck and the time when they are compelled to follow the head. Thus, they may enter the pelvis directly transversely and rotate indifferently into either oblique diameter, and at any level, which will also control the movement of restitution.

How would you recognize an R. O. A.?

Palpation and auscultation will give the same results as in an L. O. A., except that all will be found on the right side of the mother's abdomen.

What is the mechanism of delivery in the R. O. A. position?

The same as in the first, or L. O. A. position, except that the sagittal suture is in the left oblique diameter, and the occiput directed toward the right ilio-pectineal eminence; and in general the same description will apply throughout, substituting right for left, and vice versa.

How often does this position occur?

Very seldom, owing to the infrequency of left lateral obliquity of the womb, and the presence of the rectum on the left side of the pelvis.

How is the head situated in the R. O. P. position?

The occiput is opposite the right sacro-iliac symphysis, the forehead opposite the left ilio-pectineal eminence, and the sagittal suture lies in the right oblique diameter.

What are the causes of posterior occipital presentations?

Normally the fetal head should enter the pelvis with the occiput

anterior to the transverse diameter of the pelvic inlet. The causes of the posterior position are:

1. Lack of relation of maternal pelvis and fetal head.
2. Lack of amniotic liquid.
3. Weak uterine contractions.
4. Torn or relaxed pelvic floor.
5. Poor flexion.

How may the head enter the pelvis?

1. It may enter with the occiput anterior to the transverse diameter (right or left) and rotate posteriorly.
2. It may enter with the occiput behind the transverse line and rotate still further back into the hollow of the sacrum.

What is the mechanism of delivery in the R.O.P. position?

There are four different processes by which it may be terminated.

1. Anterior rotation at the inlet.
2. Anterior rotation at the outlet, or during descent.
3. Anterior rotation on the perineum, and
4. Posterior rotation throughout.

What is meant by anterior rotation?

The rotation of the head so as to bring the occiput in front, thereby converting the position into an R. O. A.

How does anterior rotation occur?

1. From the fact that the foramen magnum is near the occipital end of the head, the shoulders are thrown further back in this position, and therefore the right shoulder impinges upon the vertebral column or promontory. If it should be pushed off on the right side, the child's back will be brought in front. This twists the neck, and the untwisting force of its elastic structure tends to rotate the head with the occiput in front. This occurs most easily at the inlet, next at the outlet or during descent, and rarely, even when the head has reached the perineum.
2. The resistance of the posterior pelvic wall to the occiput is greater than that of the anterior wall upon the forehead, owing to the narrowing of the pelvis under the sacro-iliac arch, which also aids in anterior rotation, and, according to some, is the only cause.

What must occur before anterior rotation?

Flexion, continued until the circular cervico-bregmatic outline is reached.

Under what circumstances does posterior rotation occur?

If the child's back is turned toward the mother's back and remains so, the head cannot rotate anteriorly, and is delivered with the forehead under the sub-pubic arch. Posterior rotation of the occiput is favored by a relaxed or torn pelvic floor, lack of relation between the size of the fetal head and the mother's pelvis, and deficient uterine contractions.

What difficulties are encountered in posterior rotation?

1. The labor is more prolonged, because the uterine force is transmitted through the posterior and narrow portion of the pelvis.
2. The perineum is endangered, because the head cannot be fully flexed while passing over it.

How may we recognize the R. O. P. position by internal examination?

1. At the beginning of labor the anterior fontanelle (usually large) will be found very accessible in front and to the left in right occipito-posterior position.
2. As flexion occurs the fontanelle will move upward and become less accessible, which is directly the reverse of the course followed by the posterior fontanelle in L. O. A.

How may we recognize the R. O. P. by external examination?

By palpation the anterior plane of the fetus can be felt extending toward the front of the mother. The fetal members can be more plainly outlined thus than when the back is directly anterior. The line of greatest resistance is more to the right and further back than in an R. O. A. In some cases, by turning the mother on her left side, the back of the fetus can be plainly outlined.

Auscultation will show the maximum of intensity of the fetal heart-sounds to be midway on a line extending from the right sacro-iliac joint to the point of intersection of the transverse and perpendicular lines.

What is to be avoided?

Attempts to rotate the head without reference to the position of the shoulders. It endangers the child's life, from over-twisting of the neck, and is rarely successful.

How is the diagnosis L. O. P. to be made by external examination?

The same as in R. O. P., except that the fetus lies on the opposite side.

What is the mechanism of delivery in the L. O. P. position?

The same as in the third or R. O. P., except that anterior rotation converts it into an L. O. A., and in general left is to be substituted for right, and vice versa, throughout the description.

How should posterior rotations of the occiput be managed?

1. In many cases anterior rotation occurs spontaneously.
2. As soon as discovered a reasonable effort should be made to rotate the shoulders with the back in front by external manipulation.
   If this fails, the vertex may be rotated anteriorly by inserting a hand in the uterus and grasping the head.
4. Have the patient lie on the same side that the back of the child is on; this causes the fundus of the uterus to gravitate downward and favors anterior rotation.
5. If pelvis and child are of relative size, podalic version may be performed.
6. If some anterior rotation has been gained by other methods, the Simpson axis traction forceps may be applied and traction made in the axis of the pelvic inlet; the vertex may rotate anteriorly.
7. If direct posterior rotation has occurred, apply the Tarnier axis traction forceps and deliver in flexion.

What are the causes of the Face presentation?

1. Hydramnios.
2. Deformities or contractions of the pelvis.
3. Twin pregnancies.
4. The projecting rim of a placenta prævia.
5. From a misdirection of the uterine axis (due to pendulous abdomen and the like) the contractions may propel the head, originally presenting the vertex in such manner that its occiput is arrested at the brim, while the facial end, being free, descends. Thus an L. O. A may be converted into an R. M. P., and an R. O. P. into an L. M. A.
6. External violence or jarring may disturb and change the presentation.
7. Congenital goiter, spasmodic contraction of the neck muscles of the fetus thus extending the head may be a cause, or the child may, by reflex movements, extend its head. It occurs about once in 250 labors. It is more common in multigravidous than in primagravidous patients.

What plane and diameters are described in the Face presentation?

A plane drawn through the anterior limit of the anterior fontanelle,

the malar bones, and the junction of the chin and neck, is called the *trachelo-bregmatic* plane.

It is of elliptical outline and nearly parallel to the cervico-bregmatic plane, but smaller. Its long diameter is called the trachelo-bregmatic; its transverse diameter, drawn from one malar bone to the opposite, the *bi-malar*.

How is the head situated in the L. M. A. position?

The chin is opposite a point in front of the left acetabulum; the anterior fontanelle is opposite the right sacro-iliac symphysis. The features of the face (eyes, nose, mouth, etc.) may be felt between the points.

How could an L. M. A. be diagnosticated before birth?

Palpation will show the fetal lines in nearly the same position as in an R. O. P.

Auscultation will show the maximum of intensity of the fetal heart-sounds to be *on* the transverse line to the *left* of the perpendicular line.

What is the mechanism of delivery in the L. M. A. position?

The head descends in complete extension with its trachelo-bregmatic diameter presenting in the right oblique diameter, and without difficulty, until the cervico-bregmatic plane has entered the pelvis. By this time the diameter of the neck or upper part of the chest is added to the cervico-bregmatic diameter, and as this constitutes too large a bulk to pass, one of two things now occurs: if the head of the fetus and the mother's pelvis are of relative size and the chin continues its anterior rotation until it is under the pubic arch, it is easily born in flexion. The left or anterior shoulder, after delivery of the head rotates under the symphysis causing the face to turn to the mother's left side. The expulsion of the body follows. If, however, the chin rotates posteriorly, labor ceases and impaction occurs.

How is this difficulty overcome?

As soon as the head can reach far enough to be acted on by the perineum, the perineal force will cause the head to be flexed, and allow it to sweep easily over the perineum. Therefore, if the head is small, or the neck long, there may be no delay in flexion and delivery. Otherwise the head must remain stationary until it is moulded and wire-drawn, so as to enable it to reach the perineum.

What effect has this delay, etc., upon the child?

1. It is endangered by the pressure upon its cervical structure.

2. The caput succedaneum forms easily upon the face, and the parts may be perilously swollen and infiltrated.

What treatment is demanded and why?

Since the delivery can be readily accomplished by securing flexion after the face has reached the inferior strait, we should assist the mechanism—

1. By attempting to flex the head with the fingers, and
2. With the forceps, if the fingers fail, or traction is necessary to bring the head low enough to be flexed.
3. When the head has reached the pelvic floor, the chin being anterior, and extension complete, delivery may be effected by axis-traction forceps applied to the sides of the child's head. Delivery is accomplished in complete flexion over the perineum, the chin being under the pubic arch.

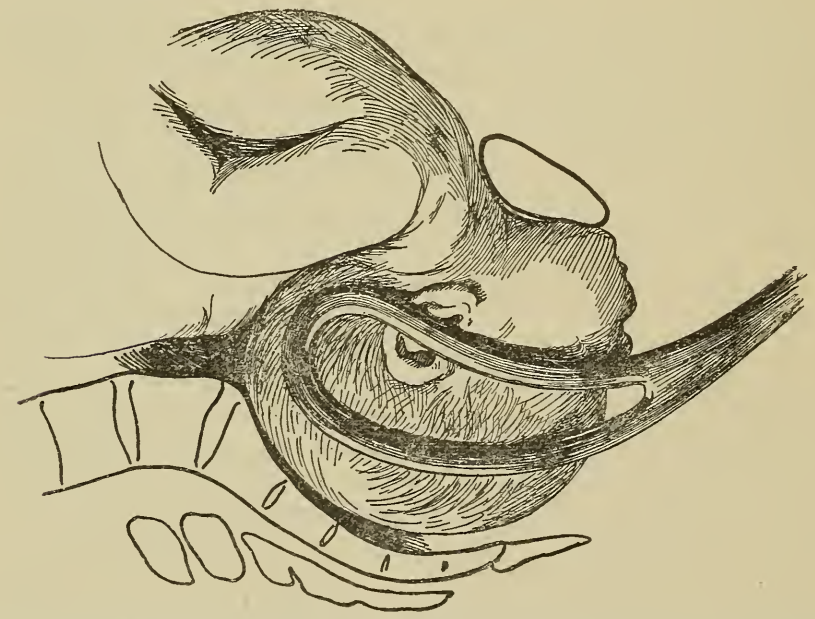

FIG. 50.—FACE PRESENTATION. DELIVERY OF THE CHILD'S HEAD IN COMPLETE EXTENSION BY FORCEPS.—(*Edgar.*)

4. If the chin remains behind and the head cannot be flexed, a podalic version may be performed and the child delivered this way.
5. If the patient is in a hospital and has not been handled there is no reason why these chin posterior cases should not be delivered by Cæsarean section.

How can an R. M. A. position be diagnosticated before birth?

Palpation will show the fetal lines to be in nearly the same position as in an L. O. P.

The maximum of intensity of the fetal heart-sounds will be *on* the transverse line to the *right* of the perpendicular line.

What is the mechanism of the R. M. A. position?

The face enters the pelvis with the chin in front and to the right, and in general the same description will apply, substituting right for left, and vice versa, throughout.

How can an R. M. P. be diagnosticated by external methods?

Palpation will show the fetal back to be anterior and toward the left side of the mother's abdomen. The examining hand sinks more deeply into the right side of the pelvic cavity than in the left.

Auscultation will show the maximum of intensity of the fetal heart to be *on* the transverse line and to the *left* of the perpendicular.

What is the mechanism of the R. M. P. position?

1. The trachelo-bregmatic plane enters the pelvis with the chin opposite the right sacro-iliac symphysis. The forehead remains stationary at the front part of the brim, while the base of the skull and upper part of the chest attempt to advance under the sacro-iliac arch, which is impracticable.
2. The shoulders will thus be made to impinge upon the vertebral column, and will have a tendency to be pushed to the right of the promontory, with the back in front. This will twist the neck, and tend to rotate the head into an R. M. A. position, and the labor is terminated as in that position.

The key to the mechanism, therefore, is *anterior rotation* of the chin from the right sacro-iliac joint forward to the left until it is under the pubic arch as labor advances and engagement occurs. If this fails to occur, the head and chest become tightly wedged, and unless the head is very small, or the pelvis large, delivery is impossible.

What is the mechanism of the L. P. M. position?

The face enters the pelvis with the chin behind and to the left, and in general the same description will apply, substituting left for right, and vice versa, throughout. External diagnosis is made in the same manner as in R. M. P., except that the fetal lines are felt and heart-sounds heard on the opposite side.

What is the Brow presentation?

A variety of the Face presentation, the upper part of the face presenting. It is converted either into a full face or into a vertex presentation, or cannot be delivered naturally unless the head is very small.

What plane and diameter are described in the Breech presentation?

A plane drawn transversely through the ilia and sacrum, called the bis-iliac, from its long diameter, drawn between the crests of the ilia. It is of elliptical outline and almost identical with that of the shoulders.

How can an L. S. A. be diagnosticated before labor?

Palpation will show the rounded breech, larger than the head and without a constricted part above it, to be in the left lower segment of the uterus. The fetal back is anterior and toward the left side of the mother's abdomen.

Auscultation shows the maximum of intensity of the fetal heart-sounds to be at a point near the perpendicular line, on a line extending from the middle of the last false rib to the intersection of the transverse and perpendicular lines. Digital examination by vagina will reveal the buttocks and genital organs either at the pelvic brim before engagement or within the pelvic brim after engagement has occurred. The fetal back is toward the mother's left side.

How is the breech situated in the L. S. A. position?

The sacrum is in front of the left acetabulum, the right ilium under the left sacro-iliac symphysis; the left ilium in front of the right acetabulum, and the pubes in the free space in front of the right sacro-iliac symphysis; the bis-trochanteric diameter of the fetus is in relation with the left diagonal of the mother's pelvis.

What is the mechanism of the L. S. A. position?

The bis-iliac or bis-trochanteric diameter enters the pelvis in the left oblique diameter, the fetal sacrum being in relation with the mother's left ilio-pectineal eminence. Rotation occurs during descent, from right to left, so that when it arrives at the vulva, the left ilium is directly in front and the sacrum directly toward the left side. Since the breech is quite compressible, advantage is taken of this to enable it to pass out of the vulva with less distention of the perineum, by one of the hips passing in advance of the other, the left hip is at the pubic joint and the right sweeps over the perineum. The breech being born, the body

and legs emerge, next the shoulders, following the same mechanism, and finally the head, which enters in the right oblique diameter rotates from left to right, and passes down strongly flexed.

What is the mechanism of the R. S. A. position?

The same as in the first, substituting right for left, etc. The diagnosis previous to labor is to be made on the same principle.

What is the mechanism of the R. S. P. and L. S. P. positions?

So far as the breech is concerned the mechanism is the same as in the sacro-anterior position (making allowance for change in *direction*). But when the head enters the pelvis it will be in an occipito-posterior position, and there will be the same need for anterior rotation as in the corresponding vertex positions.

How is the diagnosis of these to be made by palpation and auscultation?

In the R. S. P. the anterior plane of the fetus is toward the mother's front, the back being toward the right sacro-iliac joint. The maximum of intensity of the fetal heart-sounds is on the same side as in an R. S. A., but at a point farther from the perpendicular line. In an L. S. P. the diagnosis is made on the same principle, substituting, of course, left for right.

What dangers are connected with the breech presentation?

1. Compression of the funis.
2. Premature respiration.
3. Inhalation of mucus, etc.
4. Extension of arms over head.
5. Extension of the head.
6. Rupture of the perineum.

How may the funis be compressed?

If there is any delay in the birth of the head after the body is born, the funis may be compressed between the head and pelvic walls, thus asphyxiating the child.

What is premature respiration?

After the birth of the body, the contact of air may excite respiration and abolish the placental circulation. Delay after this may result in asphyxia. Pressure on the cord while the child is still within the uterus or even if the body is born and the head is within the pelvis will produce attempts at respiration causing the child to swallow amniotic liquid and mucus resulting in fatal asphyxia, or on the other hand the child may not be able to get enough air to support life.

How may inhalation of mucus occur?

The child may respire while the head is detained in the passages, and may draw mucus or fluids into the lungs, causing either asphyxia or pneumonia after birth.

How may the arms be extended?

The arms are naturally flexed upon the child's body, and pass out with it, but if arrested by the pelvic walls, they may be extended alongside of the head, increasing its diameter, and making delivery impossible until they are brought down.

How are the arms to be brought down?

One or two fingers are to be passed by the child's head and laid upon an arm from behind. The arm is then to be pushed across the child's *face*, and so on until brought down by the side of the body. This may be repeated with the other, if both are extended.

How may the head be extended?

The head is usually so tightly grasped by the uterus and vaginal walls as to be kept flexed, but if the pelvis is small, or improper traction is made upon the body, it may be extended, and will then present a large outline in passing through the pelvis. This makes its advance more difficult, and may cause a laceration of the perineum.

What is the fetal mortality in the breech presentation?

From 30 to 50 per cent.

How should a breech case be managed throughout?

As a rule, labor should not be interfered with until the breech is born. The patient's strength should be kept up and she had better be in bed, preferably lying on the side toward which the child's back points. Always preserve the membranes as long as possible. The first stage of a breech presentation is always long, as the breech makes a much poorer dilator than does the head. The physician should then—

1. As soon as the hips are delivered, draw down a loop of the cord, as otherwise it may be compressed between the child's head and the pelvic brim during the descent of the former, and, not being able to pass down as rapidly as is required, it may be torn off at the umbilicus or so stretched as to interfere with the placental circulation. If the cord is pulsating strongly, place the loop thus drawn down out of the way in the postero-lateral part of the pelvic excavation. If

the pulsation is feeble or absent, hurry the delivery. As soon as the body is born as far as the shoulders, it should be wrapped in a warm wet towel to prevent premature attempts at respiration and the consequent inspiration of mucus from the vagina.

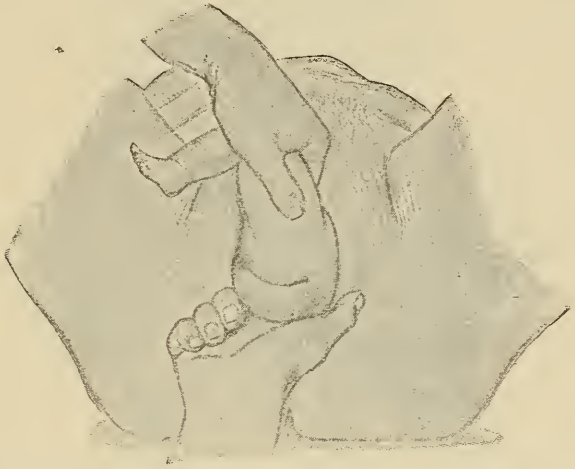

FIG. 51.—BREECH EXTRACTION. TRACTION ON THE ANTERIOR LEG AND GROIN AND POSTERIOR GROIN.—(*Edgar.*)

FIG. 52.—BREECH EXTRACTION. TRACTION ON BOTH GROINS.—(*Edgar.*)

2. In many cases the shoulders effect spontaneous engagement. When, however, this is shown the child's body wrapped in a warm towel should be grasped in one hand while the other makes pressure over the pubic region. The child's body should be carried slightly

upward and to the opposite side from that on which the back is. The object of this is to bring the posterior shoulder into the inlet and at the same time not to disturb flexion of the head.

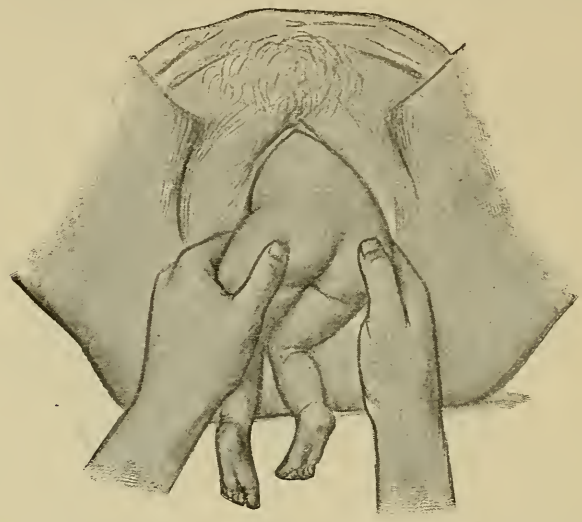

FIG. 53.—BREECH EXTRACTION. DOWNWARD TRACTION ON THE GROINS.—(*Edgar.*)

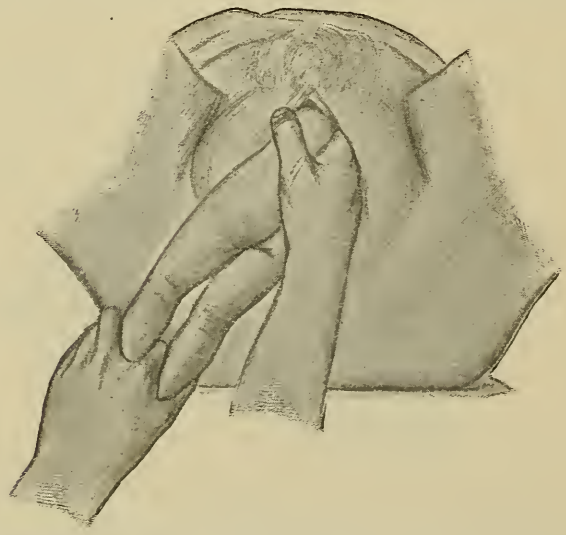

FIG. 54.—EXTRACTION OF THE AFTER-COMING HEAD. DELIVERY OF THE POSTERIOR ARM.—(*Edgar.*)

3. As soon as the body is born, bring down the arms, if extended.
4. If the head is not at once born, pass two fingers to its mouth, to

maintain the head in flexion and to secure a supply of air and to admit of respiration.

5. Draw the body down against and parallel to the perineum (to flex the head). Then elevate the body, turning it over on the mother's abdomen while making traction. An assistant, if possible, should press upon the hypogastrium, to force the head down. Repeat the manœuver, if necessary.

What is Smellie's method of extraction of the after-coming head?

In this method the body of the child is wrapped in a warm napkin and placed astride the operator's arm. The index and middle fingers are on the canine fossa on each side of the child's nose. Upward pressure is made at the same time with the fingers of the other hand upon the occiput. By raising the trunk, the head is rolled out over the perineum. The head must be completely rotated before this method can be used. This method is particularly adapted for extraction when the fetal head has entered the pelvis.

What is the so-called Smellie-Veit modified method?

This consists in combined traction on the chin and shoulders, and is frequently used when the above method has failed. One hand is introduced as in the Smellie method, and the index and middle fingers of the other hand should be forked upon the shoulders. A somewhat downward traction should be made, until the cervical region is under the pubes. If by an upward movement of both arms the body is elevated, the face will rotate over the perineum. It is claimed that by this method the greatest traction can be used with the least damage to the child.

What means should be used where the occiput has rotated into the hollow of the sacrum?

Lusk advises in cases where the forehead is pressed against the symphysis to reverse the above-named method. As the fingers are forked upon the shoulders, the back of the child should rest upon the arm. The chin should be flexed with one or two fingers of the other hand. Traction should be made in a downward direction.

What is the method of Prague?

The feet are seized with one hand, and the body directed nearly vertically downward. While this is being done the fingers of the other hand are hooked upon the shoulders, so that the finger-tips rest above

each clavicle. Both hands exercise traction at the same time. It is sometimes necessary, when uterine contractions are weak, to have an assistant make pressure on the head through the abdominal walls. After the head has passed the superior strait, the feet should be quickly raised toward the mother's abdomen.

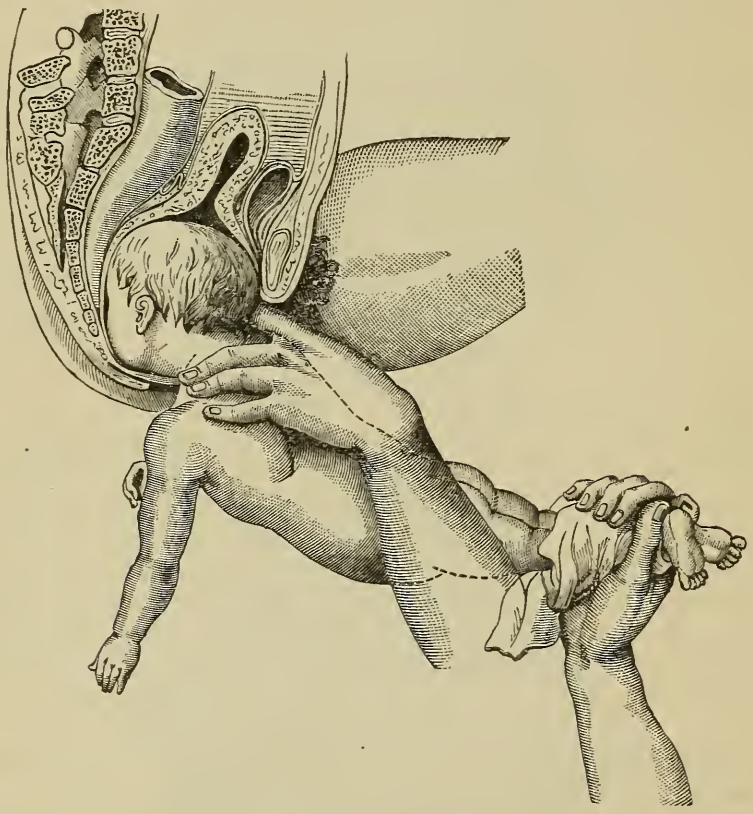

FIG. 55.—METHOD OF PRAGUE.

How should this method be modified where the occiput rotates into the hollow of the sacrum?

The body of the child should be directed toward the mother's abdomen, so as to cause rotation of the occiput over the perineum.

In what cases is the Prague method of greatest service?

In somewhat contracted pelves, in which the chin normally is partially extended as the head engages in the sagittal diameter of the brain. (Lusk.)

What caution is necessary in pulling upon the child's body?

The neck breaks with the weight of 100 lb., and decapitation occurs with 120 lb. (Matthews Duncan.)

Under what circumstances is earlier interference indicated?

When the labor is unduly protracted we may suspect that the soft breech is spreading out and being wedged in the pelvis, rather than being molded into a shape suitable for passing. We may then—

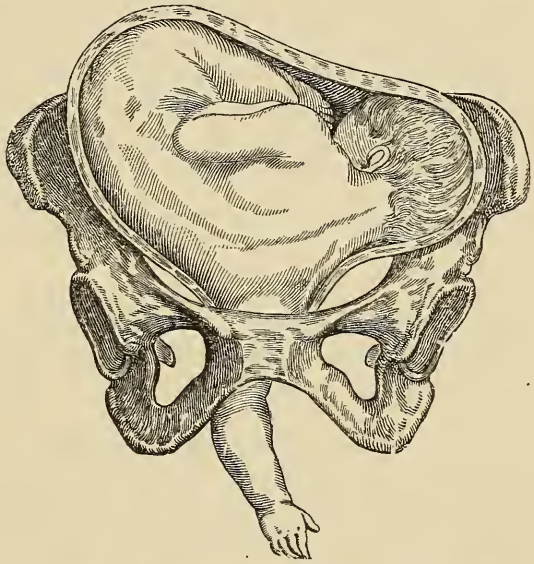

FIG. 56.—LEFT DORSO-ANTERIOR POSITION AND PRESENTATION.

1. Carefully introduce the hand and bring down one or both legs to use in making traction, or
2. We may use a *fillet*. Pass a silk handkerchief or roller bandage over the child's groin, to use in making traction. A "blunt hook" or other metallic instrument should never be used on a living child.

What varieties of the breech presentation occur?

One or both feet or legs may come in advance of the breech, which is called a "breech footling."

How does the descent of one or both feet affect the mechanism?

Very little, except by offering a temptation to pull upon them, and thus to extend the arms and head. The first stage of labor may be longer, from the want of an even dilating wedge in the os.

How is the child situated in the L. D. A. position?

The right shoulder presents in the os uteri, the head lying in the left iliac fossa and the breech in right iliac fossa, or a little higher.

How is the child situated in the R. D. A. position?

The left shoulder presents in the os, the head lying in the right iliac fossa, and the breech in the left iliac fossa, or a little higher.

How can we diagnosticate these two positions previous to labor?

The long axis of the fetus will, by palpation, be found in both positions to extend transversely across the pelvis. The hard globe of the head will be found in the right iliac fossa, in the R. D. A. position, while the broader breech will be found higher up on the opposite side. In the L. D. A. the opposite position of head and breech obtains.

Auscultation will give the heart-sounds *on* the perpendicular line midway between its point of intersection with the transverse line and the pubes. The point of maximum intensity is nearly the same for all transverse positions.

How is the child situated in the R. D. P. position?

The right shoulder presents in the os, the head lying in the right iliac fossa, and the breech in the left iliac fossa, or a little higher.

How is the child situated in the L. D. P. position?

The left shoulder presents in the os, the head lying in the left iliac fossa, and the breech in the right iliac fossa, or a little higher. The main points of differentiation by external examination are the same in R. D. P. and L. D. P. as in the L. D. A. and R. D. A., except that the head and breech can be outlined on opposite sides of the pelvis.

What are the modes of delivery in the transverse presentation?

There is no natural mechanism, but

1. The child, if very small, may be doubled up and expelled. (Rare.)
2. The child may be spontaneously turned in utero, so that it becomes either a vertex or breech presentation. (Rarer.)
3. After the child has been doubled up, the breech may be pushed down after great efforts. This is called spontaneous evolution. (Rarest.)

How should a transverse presentation be managed?

We should not await any of the spontaneous methods, but turn the child to a vertex of breech presentation. (See Version.) If

this is impossible, we will have to perforate the chest and reduce the size of the child. (See Embryotomy.) If the child is living and the mother is in good condition and not infected and, especially if hospital facilities are at hand, the child may be delivered by abdominal Cæsarean section.

What variety of the transverse presentation occurs?

The hand or arm may be in advance of the shoulder, and may present at the vulva. Care should be taken not to confound the hand and foot with each other.

What anomalous presentations are occasionally observed?

1. The body of the child may be so doubled that the feet present with the vertex or face. 2. One or both hands may be added to the vertex or face presentation. 3. The funis may present with any of the others.

PATHOLOGY OF LABOR

DYSTOCIA

What is dystocia?

The technical name for labor which departs from the normal standard.

How is labor rendered abnormal?

By disease, defect, or accident affecting—

1. The motive force. 2. The fetus and its attachments. 3. The mother's tissues or general condition. We have, therefore, three classes of dystocia: 1. Uterine. 2. Fetal. 3. Maternal.

In what way may the motive force be affected?

It may be: 1. Excessive. 2. Deficient. 3. Irregular.

What evils may excessive uterine action occasion?

1. Precipitate labor, involving a too sudden emptying of the womb, with laceration of the cervix and perineum.
2. Rupture of the womb when there is much resistance.

What is deficient action?

Uterine *inertia*, or any deficiency in the power, length or frequency of the uterine contractions.

What evils may uterine inertia occasion?

The principal one, and which involves many evils, is *delay* in the

labor. Delay is hurtful, more or less, according to the stage in which it occurs.

1. At all times the protraction of labor beyond its normal limits enfeebles the mother and endangers the child's circulation.
2. In the second stage additional dangers arise, from pressure upon the maternal tissues, with possibilities of sloughing, fistulas, and septic processes.
3. In the third stage inertia may lead to fatal hemorrhage, thrombosis in uterine sinuses, with subsequent septicemia and other diseases.

What are the causes of uterine inertia?

1. Defective innervation or circulation of the uterus.
2. Paralysis of the uterus from over-distention.
3. Organic defects in the uterine muscles.

In what ways may the innervation and circulation of the womb be affected?

The nervous supply of the uterus being spinal, cerebral (vasomotor), and ganglionic, it may be affected by mental emotion, the shrinking from pain of the hysterical temperament, improper ventilation, or from either direct or indirect disturbance of the uterine center. The latter may be occasioned by malarial poisoning or by reflex influences from other disturbed organs. Premature rupture of the membranes is frequently associated with inertia, probably as cause.

How may the uterus be paralyzed from over-distention?

The walls of the uterus may be mechanically over-distended by twins or dropsy of the amnion, making the contractions feeble.

What organic defects are met with?

The uterus which has frequently gone through the processses of pregnancy often has its fibrous and uncontractile elements increased at the expense of the muscular tissue. This decreases the power of the uterus; hence, old multiparæ frequently have protracted labors from this cause. It is said that fatty degeneration sometimes occurs.

How should uterine inertia be treated?

If sufficiently great to unduly prolong labor, we should—

1. Endeavor to ascertain and remove the cause.
2. Place the woman under the best hygienic conditions.
3. If the source of reflex disturbances cannot be removed, we may

quiet the nerve center by chloral, opium, or the bromid of potassium, after which the inertia is commonly relieved.

4. When the patient is suffering from fatigue during a protracted labor, quinin and tonic doses of strychnin are of great use.
5. Massage and stroking of the uterus through the abdominal walls may be tried.
6. If over-distension exists, we should early rupture the membranes.
7. In the second stage we may *supplement* the uterine force (*a*) by the Walcher position, Kristeller's method; (*b*) by the use of hypodermatic injection of "pituitrin;" (*c*) by the forceps.

What is the Walcher position?

The patient being in the dorsal position, is brought to the edge of a bed or table of sufficient height that her thighs are allowed to hang down so that the toes just touch the floor, or her feet may be supported on the lower rung of a chair. The buttocks must be slightly over the edge of the bed. The result of this position is to tilt the pelvis downward and backward, at the same time stretching the pubic joint. The result of this is to slightly enlarge the pelvic brim. This position may be supplemented by Kristeller's method.

What is Kristeller's method?

Place the hands on the abdomen (facing the woman's feet). Endeavor at intervals to *push* the child through the pelvis. Called also *expression.*

What should be avoided in treating inertia?

The use of oxytocics.

What are oxytocics?

Drugs credited with the power of directly affecting the uterine muscle, and of causing or strengthening contractions. As examples of this class of agents we have ergot, cinnamon, borax, and many others. Of these the one most used is ergot.

What objections exists to the use of ergot in labor?

It is uncertain in action, when it does act, causes tonic contraction of the uterus and an unremitting effort to expel the child. If this takes place before the os is dilated, laceration of the cervix may occur; if the head is large, rupture of the womb may take place; in any event, the placental circulation will be continuously compressed, and the child in danger of asphyxia. Ergot should never be given

before the birth of the child, and, from its uncertainty, should never be depended upon in the third stage.

What objection exists to the use of stimulants?

A dose of whisky is often given, increasing the woman's courage and the contractions of the abdominal muscles. But if labor is not speedily terminated, reaction follows, and the labor will be retarded.

What is irregular action of the uterine force?

Irregular contraction of special fibers instead of general contraction of all. Its typical form is called "ante-partum hour-glass contraction." In this condition, a circular band of fibers, usually a little above the cervix, contracts firmly and tonically, while the rest of the womb remains inert. This holds the child tightly in the womb, and suspends normal contractions.

How should this be treated?

Relaxation should be attempted by anesthesia or by emetic doses of ipecac. These failing, our only resource is in artificial delivery by forceps, or Cæsarean section, or embryotomy.

What obstructions to delivery are encountered in the maternal tissues?

1. At the os uteri: rigidity, edema, atresia, or displacement.
2. In the vagina: fibrous bands, atresia, persistent hymen.
3. An unyielding perineum.
4. Tumors, including a distended bladder or rectum.
5. External: edema and thrombus of the labia; hernia.
6. Deformities of the pelvis.

What is rigidity of the os (or cervix) uteri?

An unyielding and undilatable condition, due—

1. To organic changes, and
2. To temporary spasmodic contraction of the oral fibers. The first form is due to inflammatory or hypertrophic conditions, by which the cervical fibers have become thickened and fibrous. The second form may occur at any time during the first stage of labor, and is usually associated with uterine inertia.

How may organic and functional rigidity be distinguished?

1. In organic rigidity, the edges of the os are *thick* and *dense*, and the cervix has not entirely disappeared.
2. In rigidity from spasm the edges of the os are *thin* and *tense*, giving

the sensation of sharp, wiry resistance. It is also associated with some constitutional disturbance, the woman being nervous and restless and the vagina hot and less moist than usual.

What treatment is indicated?

1. In organic rigidity, the uterine contractions should be allowed ample time to force open the os; this failing, incisions should be made with a bistoury. The patient should be placed in Sims' position, the speculum introduced, and the incisions made radiating from the os, to a sufficient extent to allow the head to come through with or without the forceps. The condition is rare, and such extreme measures are seldom called for.
2. Functional rigidity depends upon much the same causes as uterine inertia, and demands similar hygienic treatment.. Chloral, gr. xv, every hour, will be found effective. Over-stretching may be used. This is accomplished by inserting the index and middle fingers within the os, and spreading them forcibly, so as to stretch the oral fibers. The fingers exert so little real force that no judicious person can do harm with this procedure. It may be repeated in an hour, or with two or three successive contractions. If necessary, Molesworth's or Barnes' dilators may be used, to dilate with more force and rapidity.

What is edema of the cervix?

An infiltration of serum, especially into the anterior lip of the cervix, which impairs its dilatability. It is due to pressure from the child's head.

What is the indication for treatment?

To remove the cause; as long as the head remains the swelling will continue; hence, deliver with forceps before it becomes too extensive.

What is atresia of the os uteri?

Entire closure of the os, due to inflammatory adhesions of the cervical lips. It is very rare, and demands similar treatment to organic rigidity.

What is displacement of the os uteri?

Removal of the os from its normal place in the vagina, usually due to a forward displacement of the fundus. This in turn is due to a relaxed condition of the abdominal muscles. [Cases are recorded in which the fundus of the womb rested on the woman's knees, in the sit-

ting posture, throwing the os so far back as to make it inaccessible.] The same condition is sometimes caused by tumors displacing the womb in any direction, but the usual displacement of the os is backward, toward the promontory.

What are the dangers of this condition?

1. The child's head is pressed against the anterior wall of the cervix and is unable to leave the womb unless through a rent in the anterior wall.
2. The incautious examiner may mistake the thinned wall for the membranes, and make the rent himself. This condition is common enough to warrant every one in making the discovery of the os and the condition of its edges the first duty in labor.

What treatment is indicated?

Replace the womb by pushing the fundus backward, while, if possible, the finger is hooked into the os and it is pulled forward. If the displacement has been great, a bandage should be applied around the abdomen to retain the uterus in position.

What treatment is indicated for a small vagina, obstructive bands, etc.?

A vagina small enough to impede delivery will require the forceps to be used. Bands or a persistent hymen may be incised. While the head distends and makes tense the band, a knife placed between the head and band is allowed to be pushed through. Care should be taken to cut as little as possible, and to tear rather than cut after the edge is severed.

How may the perineum obstruct labor?

1. The perineum may be congenitally defective in structure, or have been imperfectly developed during pregnancy, constituting organic rigidity.
2. Or its muscular fibers may be in a condition of spasm or functional rigidity. The same measures may be used which are applicable in rigidity of the cervix, but the forceps may be used instead, which render us independent of the perineum.

What is to be done when tumors obstruct delivery?

The treatment of a distended bladder and rectum is obivous. Empty them. No rule can be laid down for other tumors. If the tumor is safely removable or can be diminished in size, it may be done.

If not, the child must be lessened in size or delivered by Cæsarean section.

What treatment do the external tumors (edema, thrombus, and hernia) require?

1. When edema of the labia is extensive enough to obstruct delivery, a number of punctures should be made with a fine bistoury, which will speedily drain and remove it.
2. A large thrombus occasionally distends the labium obstructively. A free incision should be made, the clot turned out, and hemostatics applied, if necessary.
3. Hernia rarely complicates labor. If irreducible, it requires avoidance of bearing down.

What is the most common classification of contracted pelvis?

1. *The pelvis æquabiliter justo minor*, or generally contracted pelvis, in which all the diameters are equally contracted. The *pelvis æquabiliter justo major*, in which all the diameters are enlarged.
2. The *flattened pelvis*, in which the conjugate diameter especially is diminished. The other diameters may be normal.
   As subdivisions of the last we have:
   (A) *Simple* flattened, in which only the conjugate is decreased in size. This is the most frequent form of pelvic contraction.
   (B) Generally flattened, in which the narrowing extends also to the transverse diameter.
   (C) Rachitic flat. The diameter between the anterior superior spines is equal to, or greater than, the distance between the highest points of the iliac crests. In this type of pelvis the greatest contraction occurs in the antero-posterior diameter of the inlet; the oblique diameters may also share in the contraction, sometimes one more than the other.
3. The *obliquely contracted pelvis*, principally caused by spinal curvature, hip disease, or coxalgia, by a non-symmetry of the sacrum. One oblique diameter is usually decreased. Sometimes the other is increased. Occasionally both oblique diameters are diminished in size.
4. The *funnel-shaped pelvis*, produced by posterior curvature or *kyphosis* of the lumbar spine. The conjugate is lengthened and the transverse diameter diminished.
5. The *compressed pelvis* resulting from rachitis, or osteomalacia.
6. *Spondylolisthetic pelvis*, narrowing, especially of the antero-posterior

diameter of the inlet, caused by a slipping forward of the last lumbar vertebra upon the sacrum.

7. *Pelvis narrowed* by exostoses, fractures, etc.

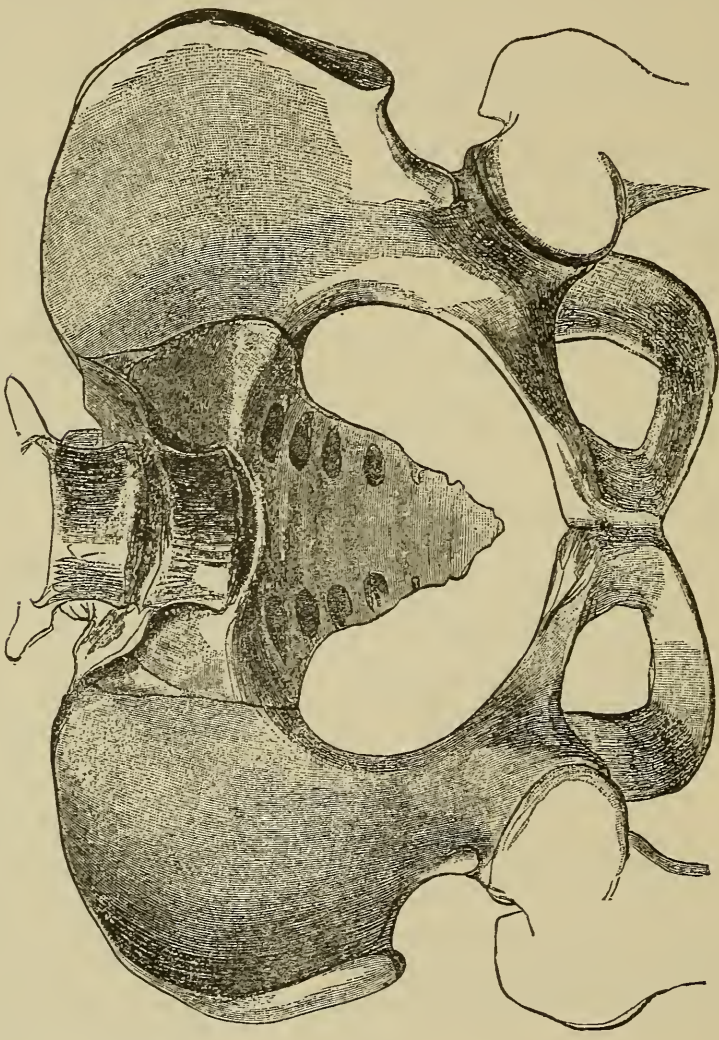

FIG. 57.—JUSTO MAJOR PELVIS.

What is scoliosis?

Lateral curvature of the spine. It may only impair one side of the pelvis, but if great, may cause serious deformity.

What effect may the justo major pelvis have on labor?

Usually labor is terminated quickly. Complications may arise,

however, from the fetus turning transversely, or from precipitate labor.

What effect may the justo minor pelvis have on labor?

If the child and pelvis are proportionate in size, labor goes on as usual, but in ordinary cases the labor begins when the head is at the

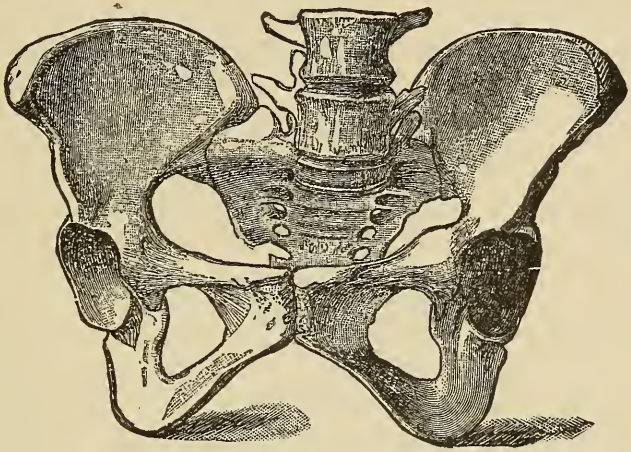

FIG. 58.—RACHITIC FLAT PELVIS WITH ASYMMETRY AND DOUBLE PROMONTORY.—(*Winckel.*)

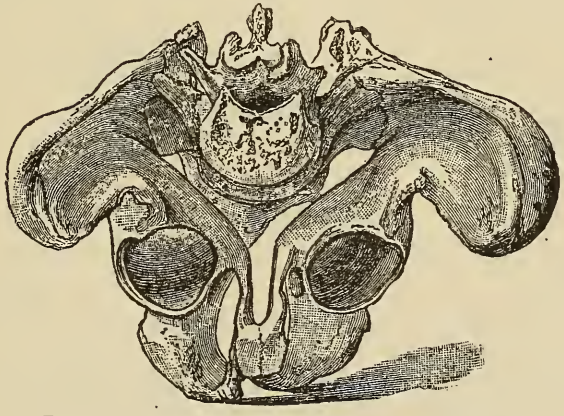

FIG. 59.—OSTEOMALACIC PELVIS.—(*Winckel.*)

superior strait, strong flexion occurring. The biparietal diameter is in relation with the conjugate.

Describe the rachitic flat pelvis and its effect on labor.

All the individual parts are decreased in size; the sacrum is pushed

forward and downward; the vertebræ are pushed forward between the wings. Usually, the venters of the ilia are inclined more strongly toward the horizon, separate more anteriorly, and are less curved. The result of this is that the distance between the anterior superior spines is as great, or greater, than that between the highest points of the iliac crests. The pubic arch is widened and the pelvic cavity kidney-shaped. If the head presents, the sagittal suture lies in the transverse diameter. The head, instead of entering the pelvic cavity

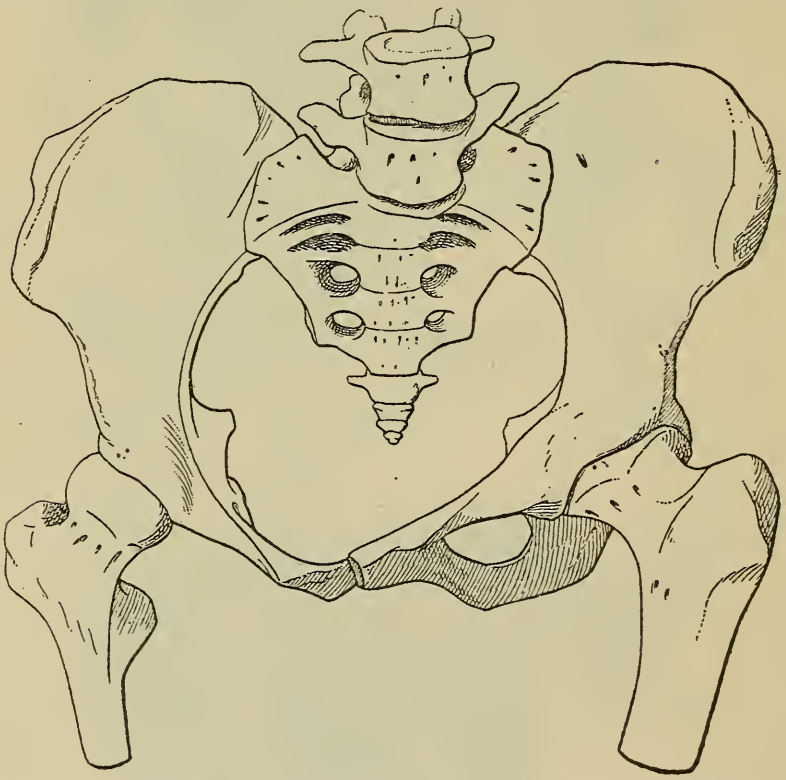

FIG. 60.—OBLIQUELY DEFORMED PELVIS FROM COXALGIA.—(*Edgar.*)

at the latter part of pregnancy, may be turned aside at the superior strait. The transverse diameter of the fetal head is in relation with the conjugate, the anterior parietal bones becoming a fixed pivot against the pubic arch, while the posterior descends beneath the promontory. An attempt is made to produce extreme flexion. After the head has descended into the pelvic cavity, labor proceeds in the usual way.

Describe the principal characteristics of the osteomalacic pelvis.

In this form of deformity softening of the bones has caused the bending inward of the anterior half of the pelvis, bringing the two pubic rami very near together in the form of an irregular beak or projection. Indications of osteomalacia will probably appear in other parts of the body. The disease may make its appearance during pregnancy.

Describe the deformity resulting from coxalgia.

The narrowing is principally oblique. In unilateral hip disease, the diseased femur is much decreased in size; the diseased hip is pushed out from the symphysis and its anterior half is more arched. From the inactivity of the glutei muscles and the increased action of the iliacus internus, the ilium is more vertical than usual, the healthy half of the pelvis is flattened and narrowed, the diseased half is hollowed out and dilated.

Do deformities of the inlet affect the whole course of delivery?

Generally the trouble is over when the head has passed through the inlet, the rest of the pelvis being undeformed.

What effect upon delivery is occasioned by deformities of the inlet?

1. The presentation is apt to be irregular.
2. The agreement between the axes of the uterus and pelvis being disarranged, the uterine force is deflected, which protracts both the first and second stages.
3. The normal mechanism of delivery is perverted.
4. The inlet is made too small to admit of the child passing readily.
5. The maternal tissues are more apt to suffer from pressure due to the misdirection of the uterine force.

In what way is the mechanism altered?

1. The head is usually more *transversely* placed, and rotation has to be made through a longer arc.
2. The head has to make a curved passage around the promontory before it can enter the inlet.
3. The narrowing of the pelvis delays the head until it can be compressed and molded to a suitable size.

How are degrees of deformity estimated?

By the length of conjugate diameter, as determined by pelvimetry.

What degree of contraction is compatible with delivery?

Much will depend upon the skill of the physician, but in general

terms it may be said that with a conjugate of 3 inches or more, a living child *may* be extracted, with or without the forceps; 3 to 2 1/2 inches, may be delivered by forceps or version, or at worst by craniotomy; two and a half or less, may be delivered by craniotomy, but the statistics show that the Cæsarean section is much safer. (Parry.)

At the present time a diameter of 3 inches or 7+ centimeters or less would be an indication for abdominal Cæsarean section.

How would we ascertain the condition of a woman's pelvis?

1. By her history: as to rickets in childhood; the time of dentition; when the latter is late, it is a sign of imperfect bone formation. The shape of the head. By careful examination of the patient's body.
2. The history of previous labors. Continued prolonged labors should cause a suspicion of pelvic deformity;
3. By inspection of the patient's external appearance in regard to deformities in locomotion, etc.;
4. External pelvimetry. The external measurements taken from certain fixed landmarks on the living pelvis, by an instrument known as a pelvimeter, are generally classed as certain signs. These measurements should be taken with the patient on her back, preferably on a table, and covered with a sheet. The head and shoulders should be raised and the knees flexed.

What are the anatomical landmarks from which these measurements are taken?

Between the anterior superior spinous processes of the iliac bones; the distances between the iliac crests, the inter-trochanteric and the external conjugate. In measuring the above the physician should stand by the side of the patient, and holding the pelvimeter between the thumb and fingers, the points should be applied to the outer sides of the points above mentioned. In measuring the external conjugate, the patient should lie on her side with her face away from the physician.

Between anterior-superior spines,	10 1/4 inches or 26 cm.
Between the highest points of the iliac crests,	11 inches or 28 cm.
Between trochanters,	12 1/4 inches or 32 cm.

Between what anatomical points are the diagonal diameters of the pelvic inlet taken externally?

The right oblique or diagonal is taken from the right posterior-superior spine of the ilium to the left anterior-superior spine of the same and measures 8 7/8 inches or 22 1/2 centimeters; the left oblique or diagonal from the left posterior spine of the ilium to right anterior-superior spine of the same and measures 8 5/8 inches or 22 centimeters.

Between what anatomical points is the external conjugate of the pelvic inlet taken?

The external conjugate is taken from the fossa just beneath the spinous process of the last lumbar vertebra to the middle of the upper

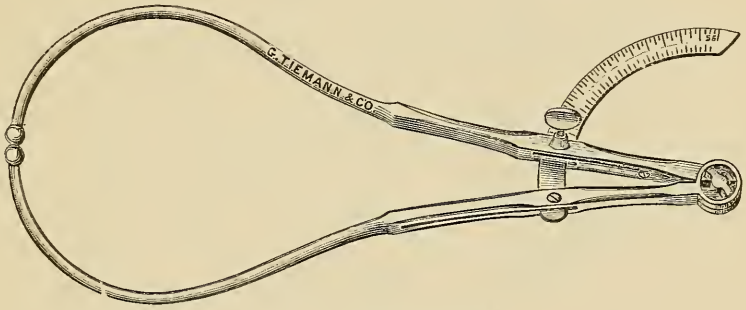

FIG. 61.—PELVIMETERS.

border of the anterior surface of the symphysis pubis. It is about 8 1/4 inches or 20.5 centimeters. This is also sometimes spoken of as Baudelocque's diameter, from its author.

How may the internal conjugate be measured?

By subtracting 3 1/2 inches, or 9 centimeters, from the external conjugate. This is the allowance for the soft parts, sacrum, and pubes. Thus the remainder, 4 1/2 inches, or 11.5 centimeters, is the average length of the internal conjugate, or conjugata vera. To measure this, one or two fingers of a well-asepticized hand should be passed into the vagina and extended so as to reach the sacral promontory. The point at which the anterior commissure of the vulva (really the undersurface of the pubic joint anterior surface) touches the hand may then be noted and the reach measured. This is the diagonal conjugate or sacro sub-pubic diameter. It measures 13.5 centimeters or 5 1/4 inches. Deduct 1 inch (2.4 centimeters) from

this for the thickness of the pubes, and we have the true or internal conjugate of 11.5 centimeters or 4 1/2 inches.

In the normal pelvis, or where a very slight degree of contraction exists, the promontory cannot be reached.

In what other way may the relation between the fetal head and the pelvic inlet be ascertained?

By pressing the head into the pelvic brim by external manipulation

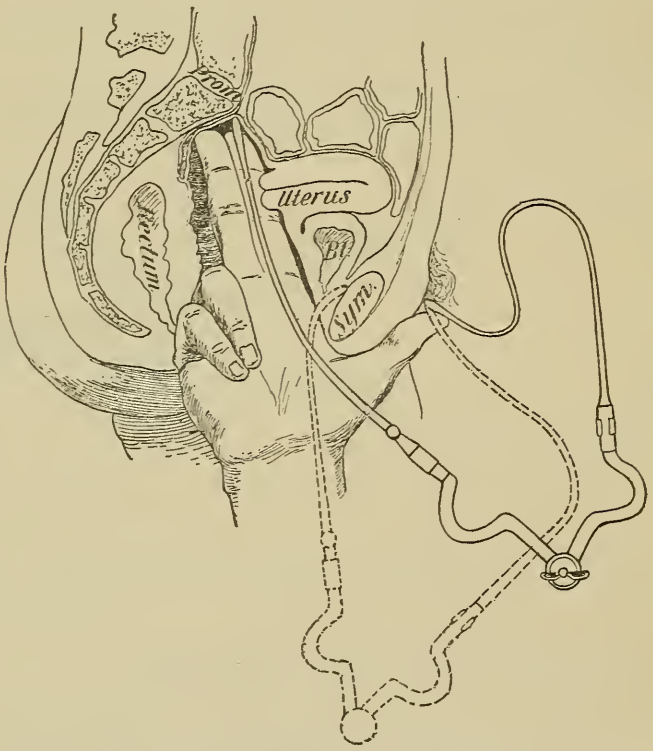

FIG. 62.—MEASURING THE TRUE CONJUGATE OF THE PELVIC INLET WITH THE SKUTSCH PELVIMETER.—(*Edgar.*)

How is this done?

The woman lying on her back with the thighs somewhat flexed, the physician should palpate the head to ascertain its exact position; then gently grasping the neck with one hand and making firm yet gentle pressure on the breech with the other, in a direction downward and backward as the patient lies, the head will be felt to slip into the pelvic cavity, providing the pelvic inlet is large enough to admit of

its doing so. The space between the head and the pubic bone can be approximated by laying the hands, thumbs together on the abdomen and gently pressing the fingers between the head and the pubic joint. In doing this the physician's back must be toward the patient's head and his finger tips toward the pubic joint.

What are the principal diameters of the pelvic cavity?

It has an antero posterior and transverse diameters. The first is taken from the junction of the second and third pieces of the sacrum to the middle of the posterior surface of the pubic joint. Its average diameter is 12.75 centimeters.

Attempts to measure the relative size of the fetus and pelvis have been made by the use of the X-ray. Various instruments have also been devised for this purpose. (See Fig. 62)

What are the principal diameters of the pelvic outlet and how may they be measused?

1. An antero posterior; taken from the tip of the coccyx to the inferior surface of the pubic point. It measures 9.5 centimeters or about 3 3/4 inches.
2. A transverse taken from the center of the ischial tuberosities. It measures 10 centimeters or 4 inches.

How may the outlet be deformed?

By a narrowing of the transverse diameter, due to a too close approach of the ischia; or of the conjugate diameter, due to ankylosis or rigidity of the sacro-coccygeal joint. The first is rare, and the second common in old primiparæ.

What treatment is indicated?

The treatment would depend entirely on the extent of the deformity. Frequently the head may be extracted by forceps, but if the contraction is discovered before labor and is normal it is better to deliver the child by abdominal section.

OVULAR DYSTOCIA

What departures from the normal condition occur in connection with the fetus and its envelopes?

1. The *membranes* (*a*) may rupture prematurely; (*b*) may be too tough; (*c*) there may be an extra amniotic sac; (*d*) there may be hydrops amnii.

2. The funis (*a*) may prolapse; (*b*) may be too short.
3. The child may be enlarged or deformed by (*a*) hydrocephalus; (*b*) hydrothorax; (*c*) ascites; (*d*) edema; (*e*) putridity; (*f*) by ankylosis of joints; (*g*) various fetal tumors.
4. Parts of the child may be displaced: (*a*) prolapse of arm or foot by head; (*b*) arm behind the occiput.
5. There may be more than one child, called multiple labor.

What effect has the premature rupture of the membranes?

1. No bag of waters is formed to assist in dilating the os.
2. The uterine walls close upon the irregular projections of the child, instead of upon the evenly-pressing water-sac, and irregular contractions may occur.
3. The first stage is prolonged.
4. The child is subjected to greater pressure, and may be injured.

What harm is occasioned by too thick membranes?

Hours may elapse before the uterus, unaided, can rupture the membranes, and during this time the patient may become exhausted. Artificial rupture should be resorted to in this condition.

What is a "caul"?

In rare cases, where there is little liquor amnii and the membranes are elastic, the child is born with its head enveloped in the membranes, which is called being born with a caul. [The membranes, when dried and preserved, are said to be a charm against death by drowning.] The practical point is to tear or cut open the sac as soon as possible, to prevent asphyxia of the child.

What is an extra-amniotic sac?

An effusion or secretion of fluid which sometimes occurs between the amnion and chorion. When the bag of waters is formed during labor, the sac will be formed by this fluid, and when the chorion is ruptured the fluid will escape, giving the impression that the true bag of waters has ruptured. A new bag will then form, enclosed only in the amnion. It is of no importance, except in the matter of diagnosis.

What is hydrops amnii?

Dropsy of the amnion or over-secretion of fluid by the amnion. This may take place to the extent of over a gallon, distending the uterus, enfeebling and sometimes destroying the child. If the amount of fluid is great, it is well to pass a bandage around the abdomen before evacuating it, and stimulants should also be at hand.

What is prolapse of the funis?

The funis, or rather a *loop* of the cord, may fall in advance of the head. There may be only a small knuckle, or several inches may prolapse, so that the cord even reaches to the vulva. This endangers the child's life, from pressure, but is rarely an impediment to delivery.

With what may the funis be confounded?

With a loop of intestine, which also may be met with after rupture of the womb. The finger may be pasesd entirely around the funis; with the intestine, the mesentery will prevent.

What treatment is indicated?

The funis should be pushed up above the inlet in the interval between pains, and when the presentation is forced down by a contraction, it will probably be retained. This can be done by the fingers or by repositors invented for the purpose, and may be aided by placing the woman in the knee-chest posture. It can also be done by carefully placing a loop of cord around the funis, attaching it to a moderately hard catheter, and pushing it gently back into the empty pelvic diameter. If the advance of the presentation does not retain it, a small piece of gauze passed between the head and the inlet will often succeed. If the cord is surely pulseless it may be let alone, but if the child is alive and the funis cannot be retained, prompt artificial delivery is indicated.

In what way does a short funis impede delivery?

By preventing the child from descending completely through the pelvis. It may be only 5 inches long, and if of normal length, may become shortened by being wrapped in one to four coils around the child's neck.

How may a short funis be recognized during labor?

1. The head is arrested low in the pelvis; it then advances slightly with each contraction, and is abruptly jerked back by the tension of the cord.
2. Constant pain is felt in the womb, over the placental insertion. Fortunately, the occurrence is rare, since the diagnosis is not easy unless the head is born, and aid is difficult to render.

What treatment is required?

Delivery by main force until the cord can be reached and cut, or is ruptured.

What is hydrocephalus?

Enlargement of the fetal head by excessive development of the cerebrospinal fluid. It may be so great as to double the length of the head diameters. The bones are thin (in extreme cases expanded and parchment-like in texture), and the sutures and fontanelles greatly enlarged. It is often associated with spina bifida.

How may it be recognized?

By the softness of the head and the enlargement of the sutures and fontanelles. Moderate degrees are not recognized with certainty until the forceps are applied, when the wide divergence of the handles shows the increased bulk of the head.

How should it be managed?

In head-first labors simple perforation of the skull will allow the fluid to escape, and permit the collapsed cranium to be withdrawn. The brain should also be broken up before the child is withdrawn. In head-last labors it is generally best to open the spinal canal between the shoulders, and by means of an elastic catheter draw off the fluid. After this the skull can be crushed and extracted. Some authorities recommend decapitation before attempting to deliver the head.

How may hydrothorax and other enlargements of the fetus obstruct delivery?

Effusion of serum in the chest (hydrothorax), abdomen (ascites), external cellular tissue (edema), may enlarge the bulk of the child and obstruct delivery. The joints may be ankylosed in such a position as to increase its bulk. A child dying in utero and becoming putrid may be swollen, but usually causes trouble only by poisoning the mother.

In any of these cases it may be necessary to reduce the bulk of the child by embryotomy.

How is prolapse of the hand or arm by the head to be treated?

The prolapsed member is to be pushed up, as in the case of prolapse of the funis. If the arm is behind the head and the diagnosis can be made, turning is indicated.

In what way may the foot or feet complicate head presentations?

One or both feet may presen alongside of the head, in which case the child must be more or less doubled up. It may be noticed that these accidents often occur together, feet, arms, and funis, in varying proportions, prolapsing at the same time.

How is the complication to be treated?

If recognized before the rupture of the membranes, the feet may either be pushed up or the child turned. If at any time we find turning to be very difficult or impossible, we may know that the child is dead (because difficult to turn and doubled), and at once perform embryotomy.

How may the shoulders give trouble in delivery?

By not entering the pelvis, but catching at the inlet, thus preventing the head from advancing.

How may this be recognized and treated?

By the manner in which the head advances and is retracted, as in the case of a short funis, and by external palpation. By external pressure the shoulders may be pushed into their proper place.

TWIN LABOR

How can twin pregnancies be diagnosticated?

The diagnosis is often difficult, but generally can be determined by hearing two distinct fetal heart-sounds, and fetal movements are stronger. By palpation, two fetal forms can be made out. The abdomen is much swollen; there is considerable bulging at each side. Sometimes a well-marked depression or sulcus occurs in the median line.

What is the usual course of twin labor?

After the first child is born a short rest occurs; the pains recur (usually within fifteen minutes) and the second child is born, and so on, if more than two.

What difficulties may occur in twin labor?

1. Both children may attempt to enter the pelvis at once, and become wedged.
2. After one head has reached the outlet, the second may enter the pelvis, with the same result.
3. Head locking may occur.

What is head locking?

When the first child is born by the breech, its chin may catch upon the chin of the second child, presenting by the head.

What general rules may be laid down for these complications?

1. To push up one child and allow the other to come down, if possible.
2. When one child is partially born and the other wedged in with it, the first child is to be sacrificed in order to save the second.

What are the fetal appendages in multiple pregnancies?

If the pregnancy results from the fecundation of one ovule containing two germinal vesicles, or a single germ dividing into two, there is a single placenta and communicating vessels. In these cases but one chorion exists; generally each child has its own amnion. Whe the development results from the impregnation of two ovules, the vessels of the placenta do not connect. In these cases each fetus has its own chorion and amnion. Early in development a separate ovular decidua exists for each. Later, through absorption of the dividing membrane, there is but one decidua for both.

What form of twin monsters complicate delivery?

The principal forms are—

1. Two nearly separate bodies united in front by the thorax or abdomen (ex., Siamese twins).
2. Two nearly separate bodies, united back to back by the sacrum and lower part of spinal column (ex., North Carolina sisters).
3. Dicephalous monsters; the bodies single below, but the heads separate.
4. The bodies separate, but the heads are partially united.

The two latter are almost invariably still-born. (Playfair.)

EFFECT OF MATERNAL CONDITIONS ON LABOR

What maternal conditions may affect labor?

1. Syncope. 2. Hemorrhage. 3. Rupture of the uterus. 4. Eclampsia.

How does syncope affect labor?

Usually by only temporarily suspending the uterine contractions. If associated with organic heart disease it may prove fatal. The treatment is the same as indicated at any other time.

What forms of hemorrhage are met with?

1. From detachment of a normally implanted placenta, before or during the birth of the child, or *accidental* hemorrhage. (See Pathology of Pregnancy.)

2. From detachment of abnormally implanted placenta, before the birth of the child, or *unavoidable* hemorrhage. (See Pathology of Pregnancy.)
3. During and after the third stage, or *post-partum* hemorrhage.

POST-PARTUM HEMORRHAGE

What is post-partum hemorrhage?

It is hemorrhage from any portion of the parturient canal after delivery of the fetus. Properly it is only from the placental site.

It is *primary* or *immediate* when it occurs within 24 hours after the birth of the child.

It is *secondary* or *remote* when it occurs any time during the puerperal period after the first 24 hours. It is much more common in multiparæ than primiparæ.

What is the cause of hemorrhage post-partum?

The immediate cause is an uncontracted or incompletely contracted uterus, whereby the opened sinuses of the placental site are not compressed and bleeding is allowed. It is favored by the retention of the placenta, clots (incomplete delivery), and by fibroid tumors. In a slight form, may be due to laceration of the cervix, vagina, and perineum. As exciting causes: 1. Improper treatment of the second and third stages of labor. 2. Forcible extraction of breech presentation. 3. Too rapid emptying of the uterus by forceps. 4. Use of anesthetics. 5. Mental emotion. 6. Placenta prævia. 7. Diseases of the pelvic organs. 8. Exhaustion following a hard labor. 9. Constitutional diseases.

As predisposing causes: Any condition causing blood changes, such as; Malaria, Toxemia of pregnancy, Hemophilia, Malpositions of the uterus, Tumors, Hydramnios.

What are the symptoms of post-partum hemorrhage?

1. Usually the blood pours out so freely as to readily attract attention; if concealed or retained in the uterus, it will occasion the symptoms of internal hemorrhage.
2. The hand placed on the abdomen will not find the womb hard and in the hypogastric region, but soft and at a higher level.

What are the indications for treatment?

Preventative.

Treat during pregnancy all conditions which predispose to post-

partum hemorrhage, and in such cases delay rather than hurry the second and third stages of labor. Keep the uterus well contracted after labor by manual compression and ergot and tonic doses of strychnin. A good tight abdominal binder will aid in this.

Curative.

1. To empty the womb.
2. To make the womb contract.

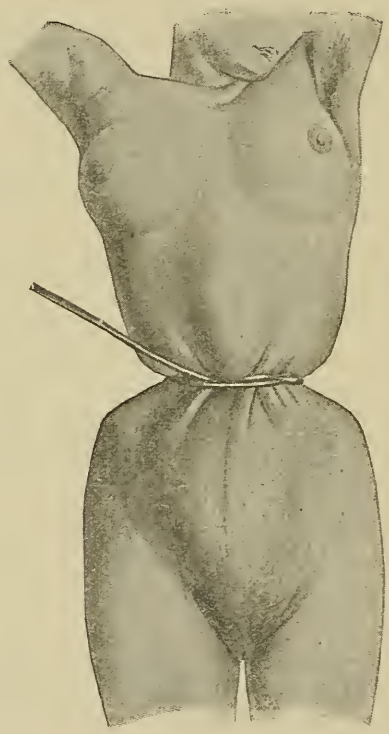

FIG. 63.—MOMBURG'S BELT CONSTRICTION FOR THE CONTROL OF UTERINE HEMORRHAGE.—(*Bumm.*)

3. To cause clots in the opened sinuses, if the womb fails to contract.
4. To support the woman's strength.

How is this treatment to be carried out?

1. The hand should be introduced into the womb, and clots or other contents removed.
2. One hand is reintroduced and moved about, stroking the uterine walls, while the other hand is similarly engaged on the abdomen.

This will often succeed in arousing contractions, and lead to the expulsion of the hand from the womb. If not,

3. Injections of sterile hot water (105° F.) may be used or alternate injections of hot and cold water, or ice.
4. A strip of new aseptic gauze may by means of dressing forceps be inserted into the uterus as far as the fundus and loosely packed, another strip being placed in the vagina until it is full.
5. A handerkchief, soaked in vinegar, may be carried into the womb and squeezed out; or a peeled lemon; or a piece of ice.
6. The faradic current may be useful, if at hand.
7. As a last resort, and to cause clots, injections of tincture of iodin, or solution of ferric chlorid, diluted one-third, or even of full strength, may be used.
8. Compression of the abdominal aorta.
9. Use of the Momburg belt.

How may post-partum hemorrhage from inertia be prevented?

By delivering the placenta by the method of Credé and by the preventive treatment before mentioned.

What internal medication is proper to combat the constitutional affects of hemorrhage?

Stimulants, hypodermics of strychnin sulph. grs. 1/40–1/20, or ergot ʒj; these may be repeated. fʒj each of strong coffee, whisky and normal salt solution may be given by the rectum and repeated. Saline transfusion or hypodermoclysis or both should be resorted to. ♏x of a 1 : 1000 solution of adrenalin chloride given by hypodermic is often of use. The foot of the patient's bed should be raised 2 or 3 feet from the floor.

What is the operation of transfusion?

Injecting into the circulation blood, milk, or solution of sodium chlorid, in strength of 0.6 per cent. (normal salt solution). To inject blood requires special and costly apparatus and great skill. Normal salt solution may be injected with little trouble. Care must be taken to avoid injecting air, and not to inject so rapidly as to distend the right side of the heart.

What is secondary hemorrhage and its cause?

Hemorrhage occurring after an interval of several hours, or even days, after delivery. It is usually preceded by ordinary post-partum

hemorrhage, and may be due to a return of uterine inertia; the detachment of thrombi, retention of pieces of membrane, or clots; displacement of the uterus, from a too tight bandage; an impacted rectum; sitting up too soon or depressing mental emotions.

What treatment is indicated?

The same in principle as in immediate hemorrhage, with due attention to the exciting cause.

RUPTURE OF THE UTERUS

What is rupture of the uterus?

A tear or laceration in the substance of the uterine body, usually permitting the escape of the child into the abdominal cavity.

How frequently does it occur?

About once in 4000 labors.

Under what circumstances does it occur?

Generally during the second stage of labor, the rent beginning in the cervix and extending toward the fundus. Rarely the peritoneal covering escapes laceration. Rupture of the uterus occasionally occurs early in the labor, or even in premature labors.

What are the predisposing causes of rupture?

Abnormal presentation, a hydrocephalic head, prolonged parturition, a degeneration of the muscular fibers of the uterus, producing a lack of contractile power; a great difference in proportion between the size of the child and pelvis.

How is the uterus affected?

During labor there is a tendency for the anterior wall of the cervix to be pulled upward, and for the posterior wall to be pushed downward (D. Berry Hart). If the head becomes packed in the inlet early, so as to prevent the anterior wall of the cervix from being pulled up, the anterior wall just above the head becomes greatly thinned, owing to this upward pulling, and rupture almost invariably begins at this point. The thickened ring of fibers just above the point of thinning is known as Bandl's ring.

What are the symptoms of threatened rupture?

A rising of the contraction ring of Bandl; this can be felt, can be seen in some cases, high up near the umbilicus. It is usually

higher on the left than on the right side. Above this ring the uterine tissue is thickened, while below it the womb is thin, stretching more and more as labor advances. Intense pain in the pubis or abdominal region.

What symptoms denote its occurrence?

During or just after a labor pain the woman is seized with an acute and *persistent* pain. The form of the uterine tumor is changed and the presentation is retracted. As blood is effused from the rent, symptoms of internal hemorrhage and shock are added. The fingers passed into the vagina readily recognize the rent, and if the child has altogether escaped into the abdominal cavity the intestines will have prolapsed through the rent. The uterine contractions cease.

What treatment is indicated?

1. Preventive; a prompt resort to the forceps when the occurrence is feared, providing the child and pelvis are of relative size. If, however, the pelvis is too small for the child to pass through, rupture of the uterus can be prevented only by delivery by abdominal section, symphysiotomy, or craniotomy.
2. Afterward, if the presentation is not entirely retracted, an attempt may be made to deliver *per vias naturales*.
3. In any case, unless it can be demonstrated that the peritoneum is unbroken, the abdomen should be opened by an incision, the uterine wound closed by sutures, all blood and fluids removed from the abdominal cavity, and strict antiseptic precautions observed. If the rent in the uterus is severe, hysterectomy should be done, providing the patient is in fairly good condition.

What is the mortality from rupture?

1. In cases abandoned to nature, nearly all die.
2. When the child is delivered without abdominal section, a few more recover.
3. When abdominal section is at once performed, 60–70 per cent. recover.

ECLAMPSIA

What is eclampsia?

A form of convulsions occurring before, during, or after labor, which resembles epilepsy in clinical appearance and uremic convulsions in cause. The typical form occurs during the second stage of labor.

What is the clinical history of an attack?

1. The patient is suddenly seized with a *tonic spasm*, involving the muscles of the face and thorax, usually of the upper extremities, and occasionally of all the muscles. This tonic spasm lasts for about *one minute*, and—
2. It is succeeded by *clonic spasms* or twitchings, lasting for *several minutes*. The convulsions subside and—
3. Are succeeded by *coma*, with stertorous breathing. The patient may become conscious or the convulsions may be renewed in the same order, keeping up until the patient is exhausted or recovers.

The masseter muscles are contracted tonically throughout the seizure. The interference with respiration causes the face to become red or livid. The duration of each seizure and the interval between depend upon the severity of the attack.

What prodromic symptoms warn us of an attack?

1. Severe and persistent headache is often complained of before an attack, frequently associated with disorders of vision, such as flashes of light. There is frequently also persistent substernal pain or distress.
2. Edema of the lower extremities or labia, or both, accompanied by any of the above symptoms, whether associated or not with albumin in the urine, should put us on our guard. A trace of albumin, however, is generally present, and with it there is usually a marked decrease in urea. The pulse tension and blood pressure are usually increased.

What is the cause of puerperal eclampsia?

The cause is complex, but may be summed up in the word auto-intoxication, the toxemia arising from the liver, intestines, kidneys and possibly the placenta. Various theories have been given such as:

1. During pregnancy the blood becomes deteriorated (hydremic), and the ill-supplied nerve centers become more irritable or convulsible (Barnes).
2. During pregnancy the processes of elimination are usually defective:
   (*a*) The bowels are usually constipated, hence toxins are absorbed from these.
   (*b*) The liver is frequently torpid and its poison-destroying action is below normal.
   (*c*) Deficient excretion by the lungs.

(*d*) Insufficient excretion through the kidneys.

(*e*) The mother is not only excreting toxins formed in her own body, but from the child's as well; so that when her organs of excretion are acting poorly, large quantities of toxins are retained.

Therefore the nerve centers are supplied with poisonous or irritating substances, as well as impoverished blood.

3. Vascular tension is increased during pregnancy, and especially during labor, which intensifies the action of the foregoing factors.
4. During labor the interference with the cephalic circulation (from bearing down, etc.) causes hydremia of the brain and of the nerve centers especially concerned with eclampsia.

Which of these factors is the most important?

The uremia, as shown by the fact that 50 per cent. of eclamptics have albumin in the urine.

Wherein does puerperal eclampsia differ from other forms of convulsions?

1. In hysteria the spasms are altogether irregular and consciousness is never entirely lost.
2. In apoplexy the condition of the coma is permanent, and there is a difference in the size of the pupils. There is not the amount of spasm.
3. In epilepsy, the history will distinguish, except in labor in epileptics, who rarely have convulsions during parturition (Parry). In epilepsy there is the peculiar cry.
5. Tetanus in a pregnant or puerperal patient usually shows a history of injury or infection. The type of convulsion is tonic only. Consciousness is preserved as a rule. The convulsions persist longer and usually begin in the muscles of the jaw. No previous symptoms pointing to the toxemia. Other conditions that may possibly simulate to a certain degree are strychnin poisoning or alcoholic convulsions. The history and a study of the convulsion ought to settle the diagnosis.

What point in the etiology is disputed?

The condition of the brain, as to anemia or hyperemia.

Traube and Rosenstein assert that hydremia causes edema of the brain, which in turn leads to anemia from pressure upon the capillaries from without. Others assert that anemia of the brain

is essential in eclampsia, and that the base of the brain is anemic, even when the convolutions are hyperemic. The probable cause of the convulsion is the action of the toxemia on the nerve centers of the brain and spinal cord.

What effect upon the cerebral circulation have the bearing-down efforts of the second stage, when eclampsia mostly occurs?

The cervical veins are obstructed and blood accumulates in the brain.

Does this occur when eclampsia takes place before or after labor?

Not demonstrably; and in these cases we conclude that other factors exist, notably uremia—or a distinct toxemia, from various poisons generated in increased quantities during pregnancy, the amount of which is too great for elimination; or, that the eliminatory power is for a time defective.

What treatment should be employed to prevent eclampsia?

The urine of women in the last weeks of pregnancy should always be examined. Should the symptoms of continued headache, flashes of light, albuminuria, and deficient excretion of solids, especially urea, make their appearance, the patient should be placed on a diet nearly or entirely of milk or milk foods, bread, and fruit. The bowels must be opened by saline cathartics or calomel. Hot baths at a temperature of 90° or 100° F. are beneficial; the patient should remain in the water from ten to fifteen minutes, and be well rubbed with a coarse towel afterward. If symptoms continue after a fair trial of the above methods, the uterus must be emptied.

What are the indications for treatment in puerperal eclampsia?

1. To excite elimination by increasing the action of the skin, liver, bowels, and kidneys.
2. To relieve the irritability of the nerve centers.
3. To reduce vascular tension.
4. To reduce cerebral hyperemia.

What treatment should be employed during the attack?

1. Ether or chloroform may be given to control the convulsions or a hypodermatic injection of 1/2 grain codein or 1/4 grain of morphin may be used. XXV to XXX grains of chloral hydrate may be given by the rectum. A towel or a piece of wood should be placed between the teeth to prevent the tongue from being bitten, or a mouth-gag may be used.

2. By means of a stomach-tube wash out the stomach with boracic acid solution or a solution of bicarbonate of soda ℥ii to the pint and afterward, through the tube give calomel, grs. v; croton oil, gtt. ss. Wash out the bowel by means of a rectal tube attached to a fountain syringe. It is well first to use a thorough purgative enema such as sulphate of magnesium, ℥ii; castor oil, ℥ii; glycerin, ℥i; turpentine, ℥ii; soap suds to make 1 quart. This should be followed shortly by an anemia of 2 to 4 quarts normal salt solution. The enteroclysis of normal salt solution may be repeated in four to six hours.
3. A hot pack may be used to promote diaphoresis.
4. The labor, if in progress, should be terminated as soon as possible, without violence. If the cervix be soft and the time of labor near, the membranes may be ruptured with the finger. Labor will probably soon start up. Eclampsia under some circumstances would be an indication for abdominal delivery or delivery by vaginal Cæsarean section.
5. Venesection, as the quickest and most powerful means of reducing the vascular tension, cerebral hyperemia, and, secondarily, the nervous irritability. The venesection may be accompanied or followed by hypodermoclysis, or intravenous injection of normal saline solution, or the latter may be used alone.
6. Veratrum viride may be used instead, or in addition to saline transfusion if there is time to wait upon its action.

What drug was especially used before the discovery of chloral and the bromids?

Opium, which relieves the irritability of the nerve centers.

What objections exist to its use?

Some believe that it allays nerve irritability at the expense of all other indications; when the kidneys are seriously crippled it may itself cause death.

MISCELLANEOUS COMPLICATIONS

What complications may exist during or after the third stage of labor, besides hemorrhage?

1. Placental dystocia, or difficulties in delivering the placenta. 2. Inversion of the uterus. 3. Emphysema of the neck. 4. Laceration of the cervix, vagina, and perineum.

What forms of placental dystocia occur?

1. Adherent placenta. 2. Hour-glass contraction. 3. A placenta too large. 4. Clots behind an inverted placenta. 5. Utero-placental vacuum. 6. Placentæ succenturiæ and other anomalies of form.

What is adherent placenta?

The term is properly applied to one that has contracted firm adhesions to the uterine wall, from inflammation during pregnancy. There is usually a history of fixed pain in the uterus. This is rare, but improper traction upon the cord may delay the separation of an otherwise normal placenta.

How is adherent placenta to be treated?

Pass the hand into the uterus, find a detached edge of the placenta, and, by a sawing motion with the fingers between the uterus and placenta, break through the adhesions. When small pieces are adherent, they are best removed by means of the douche curet of Braun, in the way described under "Abortion." The strictest asepsis must be used in these cases. In many cases it is much better to pack the uterus with gauze following a thorough intrauterine douche. The small fragments will in a short time become detached and will come away when the packing is removed.

What is hour-glass contraction?

Irregular or tetanic contraction of a part of the uterine walls, the rest being relaxed, whereby the placenta is grasped and held as if in a sac. It may be complicated, if not caused, by adherence of the placenta.

How may it be recognized?

The hand, introduced into the womb, finds apparently a second os internum high up, caused by the constriction of the muscular fibers of the womb below the placental site.

How is it to be overcome?

The fingers, little by little, and finally the hand, are to be insinuated within the constricting band and its resistance overcome. This may be facilitated by anesthetics or chloral. The best reliance is upon patient and continuous manual efforts.

How may the bulk of the placenta affect its delivery?

A very large placenta which has fallen centrally upon the os, instead of edgewise, may be too bulky to pass without assistance. The

same may occur with a placenta of moderate size, if clots have formed behind it to such an extent as to prevent it from being doubled up.

How is such a placenta to be delivered?

It should be perforated centrally by one or two fingers, which will enable us to hook into and drag it down.

What is utero-placental vacuum?

A rare occurrence, in which the placenta being detached, a pull upon the funis makes a vacuum between the placenta and the uterine wall, converting it into a sucker, resembling in action the leather disc by which the small boy raises bricks from the pavement.

How may it be detected and remedied?

It resembles at first the large placenta, or one enlarged by clots, but as soon as perforated, and the vacuum destroyed, it is delivered with great ease, or even spontaneoulsy expelled at once.

INVERSION OF THE UTERUS

What is inversion of the uterus?

The uterus is turned inside out, upside down (Parvin).

1. There may be a simple depression of the fundus, or it—
2. May present at the os uteri (partial inversion), or—
3. Passes through the os and extends to or through the vulva (complete inversion).

What is the cause of inversion?

Partial and irregular contraction of the uterus is the main factor; often aided by traction upon the cord in delivering the placenta. No one can invert a healthy womb by traction upon the cord, but if the fibers under the placental site are not contracting, inversion will be very likely to occur. It may happen either before or after the placenta is detached. Violent efforts at bearing down have been described as a cause.

How may inversion be recognized?

1. The woman usually complains of great pain at the moment of the accident (a sensation as of something tearing loose within her). 2. Hemorrhage and more or less shock follow. 3. The hand placed upon the abdomen fails to find the womb in its natural place, but in-

stead recognizes a funnel-shaped depression where the fundus uteri ought to be. By vaginal examination the inverted tumor covered by endometrium can be felt and often seen. Occasionally in complete inversion the orifices of the Fallopian tubes can be seen. It can then be mistaken for nothing but a fibroid tumor, which, of course, could not occupy the vagina just after delivery.

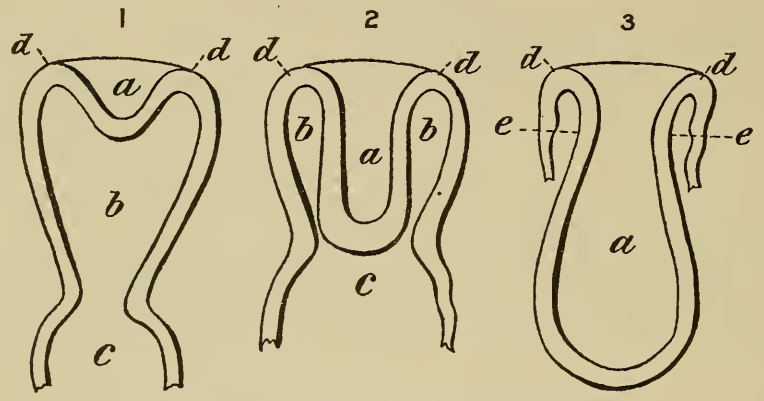

FIG. 64.—THREE DEGREES OF INVERSION.

1. Depression. 2. Introversion. 3. Complete inversion. *a*. Fundus uteri. *b*, *b*. Inversion partially filling the uterine cavity. *c*. Vagina. *d*, *d*. Mouth of inverted portion.—*From Parvin's Obstetrics.*

What is the prognosis?

Although a very grave accident, the prognosis is not hopeless. It depends much on the amount of hemorrhage and shock. If remaining long in its displaced condition, inflammation is apt to occur. The more quickly the organ is replaced, the more favorable the prognosis.

How is inversion to be treated?

1. The placenta, if adherent, is to be detached.
2. The womb should then be squeezed within the hand, to reduce its bulk, and attempts made to replace the fundus, with the hand grasping it, while the other hand presses downward in the hypogastric region, making counter-pressure.
3. If this fails, endeavor to indent the uterine globe with a knuckle or the finger tips, and thus reinvert it. The indentation is said to be best effected at the opening of a Fallopian tube. Pressure should be firmly and patiently continued, and, if employed just after the accident, rarely fails.
4. After the fundus is replaced the hand should remain within the uterus for some time, or until expelled.

5. Continuous pressure may be made by means of a colpeurynter and elastic bands. This method has been considerably used by German obstetricians.

What is to be done in case of failure?

If called too late, or if replacement cannot be effected without violence, the fundus should be bathed with somewhat diluted tincture of iodin, to restrain hemorrhage, and allowed to remain inverted for one or two months, or until involution has taken place, when the reposition may be attempted by the method of White.

What is the emphysema of the neck?

During the bearing-down efforts of the second stage, it sometimes happens that a few air vesicles in the lungs are ruptured, and air escapes by way of the mediastinal space to the cellular tissues of the neck and face. It is usually limited to one side, the tissues being swollen and crackling under the fingers. It may cause great alarm, but is innocuous if let alone, subsiding in a few days without any ill consequences.

What ill consequences attend laceration of the mother's tissues?

The only immediate consequences are hemorrhage or septic infection.

The remote consequences may be serious, especially when the perineum or cervix is badly torn.

What is to be done when the cervix is lacerated?

Some authorites recommend that sutures should at once be inserted, but in general practice, if the tear does not extend into the vaginal insertion, it is often better to let it alone, and repair it at some time later. Some obstetricians prefer to do it immediately after labor while others prefer to leave it until some weeks or months—after the uterus has undergone involution. In the latter instance an *intermediate* or *secondary* operation must be done. If the laceration be large, it is best repaired immediately to prevent subsequent hemorrhage.

What method is used in the immediate repair of a lacerated cervix?

The patient, physician and his instruments having been prepared, the cervix should be grasped preferably by two volsella forceps one pair for each lip. These should be held by an assistant. A curved needle with chromicized catgut is then passed through the

torn edges beginning at the top of the laceration. The sutures should not pierce the mucous membrane lining the cervix. Interrupted sutures are usually employed. Care should be taken not to close the cervical canal. All torn edges should be neatly approximated.

What is to be done when the perineum is lacerated?

Most authorities recommend that it should at once be united with sutures, unless of very slight extent. If the laceration is only through the vaginal mucous membrane and musculature it is an *incomplete* tear. If extending into the rectum it is a *complete* laceration. The method of closing an incomplete tear is to suture the edges of the laceration, using chromized catgut, begining from the upper end. Interrupted sutures are usually used. The stitch should include all torn surfaces. The ends of the sutures are cut close. The perineum is united with silk-worm-gut sutures begining at the vaginal end of the laceration and working downward toward the rectum. The sutures are tied and the ends left long. The suture ends may be bunched together to prevent the ends sticking the patient. The silk-worm-gut suture should be removed in eight to ten days. In complete laceration the rectum should be first closed by sutures of fine but well chromicized catgut, these should not pierce the rectal mucous membrane. All muscle bundles of the sphincter ani should be carefully united from above downward as in any other operation for complete laceration. The remainder of the operation is done in the same manner as in incomplete laceration.

OBSTETRIC OPERATIONS

What are the capital operations of midwifery?

1. The induction of premature labor. 2. The use of the forceps. 3. Version. 4. Symphysiotomy. 5. The Cæsarean section, or cœliohysterotomy, and its modifications—notably the Porro operation, or cœlio-hysterectomy. 6. Embryotomy in various forms.

What are the obstetric forceps?

Two separate and similar pieces of steel, each fashioned into a blade and handle, intended to cross each other in the middle and be temporarily united at that point by a lock.

What is the object of the forceps?

1. They are used to seize the child's head and to make *traction* upon it.

2. They are used to aid the *rotation* of the head.
3. They are used to *flex* or *extend* the head, as may be required.

Why is a fenestra or open space made in the blades?

To allow the parietal protuberances to project, thereby permitting the forceps to be applied to the head without at all adding to its bulk.

What curves exist in the blades?

1. The *pelvic* curve, so that they can be applied at any point in the pelvic canal with equal ease.
2. The *head* (or *capital*) curve, by which they are bowed outwardly, so as to enable them to grasp and hold the head.

How many forms of lock are in common use?

The mortise, or English lock; the pivot, or French lock; and the button, or German lock.

How are the blades distinguished and named?

The blade to the left is called the left blade, or, when provided with the pivot or button, is sometimes called the *male* blade.

The blade to the right is called the right blade, or, when provided with a slot, it sometimes called the *female* blade.

When should the forceps be applied?

In any case where the head presents, and where *prompt delivery* is necessary (either for mother or child), or to be regarded as preferable to waiting upon the natural efforts, providing the presenting head and maternal pelvis are of relative size.

May they be applied during the first stage?

There are few circumstances which warrant us in applying them before full dilatation of the os and engagement of the head. The necessity for prompt delivery should be very clear, since bruising and laceration of the pelvic and cervical tissues are almost inevitable.

What preliminaries are requisite to their application?

The consent of the woman being obtained, she should be given an anesthetic. The bladder should be emptied by catheter after she is under the anesthetic. The bowels should be evacuated by an enema. All the external genitals should be well cleansed by soap and water and a suitable antiseptic. The vulvar hair should be shaved off. If much handling has previously been done the patient should have a co-

pious vaginal douche of lysol 2 per cent. or salt solution. She should be placed upon her back at the edge of the bed, her thighs flexed on the abdomen, and her feet supported on chairs or preferably by an assistant. The forceps should be well boiled in a sterilizer before using.

What station should the physician occupy?

Seated upon a chair, directly in front of the vulva, the forceps placed within reach.

How should the forceps be applied to the L. O. A. position at the inlet?

1. The physician should take the left blade in his left hand, holding the handle securely, and, having anointed both the blade and the the right hand with sterile vaselin, pass the blade into the vagina on the woman's left side high enough to enable him to feel the rim of the os uteri.
2. Pass the blade along the palmar surface of the right hand or fingers, aiming to place the blade under the left sacro-iliac arch, and, therefore, along the left side of the child's head. This is usually very easy, as there is a free space at that point. Care should be taken to pass it between the cervix and head.

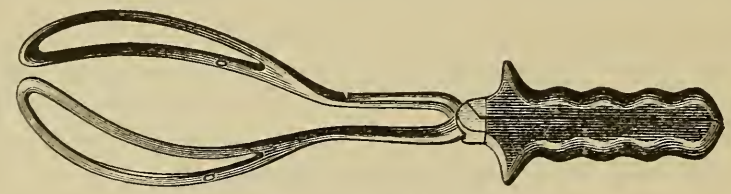

Fig. 65.—Davis Forceps—Upper View.

3. When the first blade has been adjusted to the head, its handle should be pressed well against the perineum, so as to keep it out of the way.
4. The right hand is now cleansed and takes up the right blade, which, with the left hand, is anointed, and the fingers of the latter passed into the vagina, to guard the rim of the os uteri.
5. The right blade is then introduced upon the palmar aspect of the fingers of the left hand, with the view of insinuating it between the child's head and the cervix, and, therefore, upon the right side of the head.
6. When the second blade is fully introduced, the shank of the

forceps should lie upon that of the first blade, with the slot just opposite the pivot, and, the handles being now compressed, the instrument is locked and fully applied.

How should the first blade be held at the beginning of introduction?

As the tip of the blade enters the vulva, the handle should be held nearly perpendicular, with the tip above the inner limit of the right groin. The rest of the introduction resembles the passage of the catheter in the male.

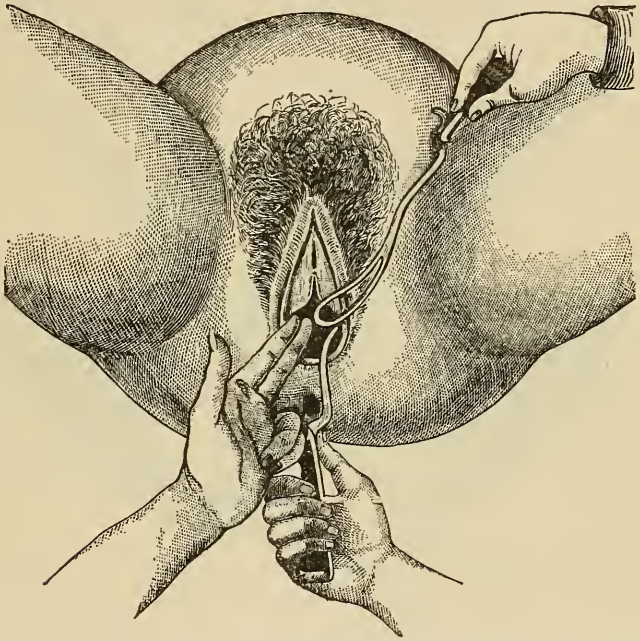

FIG. 66.—SHOWING THE MANNER OF INSERTING THE BLADES OF THE FORCEPS.

How should the second blade be held at the beginning of its introduction?

As the tip of the blade enters the vulva, the handle should lie in the line of and almost touching the left groin. The handle is then brought almost directly to the median line, and the blade pushed onward and upward, as soon as the handle is free from the left leg.

What should be done if the instrument cannot be locked?

The second blade should be withdrawn and more carefully reap-

plied. Locking can often be effected by simply pushing the handles well back upon the perineum.

How should the forceps be held in making traction?

The handles should be grasped with the right hand and gently compressed; the left hand should be placed over the lock, with a finger upon the top of each blade.

How is traction to be made?

1. The left hand presses or pushes the blades downward and backward (and slightly to the right), while the right hand pulls the handles partly in the reverse direction and partly in the line of the handles.
2. As the head descends, the direction of traction is changed, being made in the curve of the obstetric canal at all times.

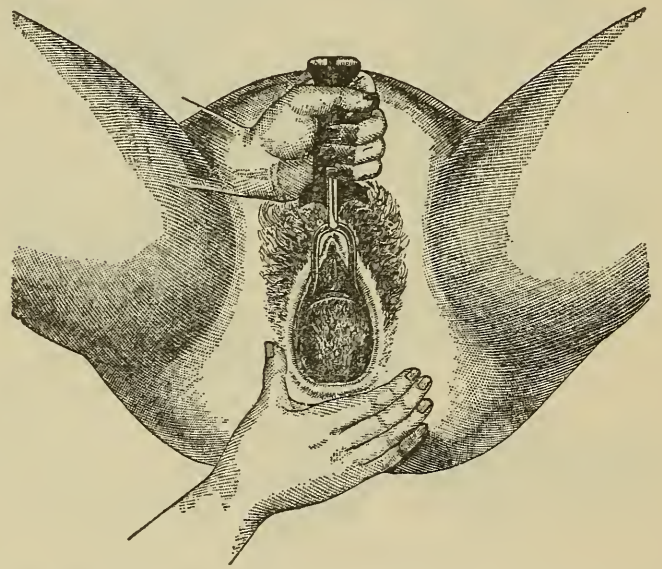

FIG. 67.—SHOWING MANNER OF MAKING TRACTION IN A LOW APPLICATION OF THE FORCEPS.

In the above cut, the left hand instead of the right is shown grasping the forceps, while the right hand protects the perineum.

How long should traction be made?

For about a minute at a time, with an interval of the same or greater length, during which the handles should be partly unlocked, to remove the compression of the forceps from the child's head.

Should traction be made during a labor pain?

The contractions may be disregarded until the head presses upon the perineum, when traction should be made only in the absence of uterine contractions, and if the operator is not sure of his skill he should withdraw the forceps at this point.

How may the forceps be withdrawn?

By reversing the motion used in applying them, and with the same deliberate ease.

How are the forceps applied at the inferior strait?

The head having rotated, the blades will be on opposite sides of the pelvis, when on the sides of the head. Therefore, both blades are passed in the same manner, and nearly as the first blade is passed in the high operation.

How are the forceps to be applied to an R. O. P. position at the inlet?

Precisely as in the L. O. A. position.

How is traction to be made in the R. O. P. position?

1. The handles should be grasped firmly, so as to hold the head securely while—
2. The handles are elevated, with scarcely any traction, so as to *flex the head;* this being a necessary part of the natural mechanism.
3. Traction should then be made in the axis of the canal, and with as *little compression* as possible, in order not to interfere with rotation.
4. If the twisting of the handles shows a tendency to rotate, this may be aided; but rotation should not be forced.

How are the forceps to be applied in the R. O. A. and L. O. P. positions?

The position of the head being the reverse of the L. O. A. and R. O. P. positions, the right side of the head is behind and at a distance, the left side in front, and near. Therefore, the right blade is first applied, under the right sacro-iliac arch, and in the same way as the first blade in the other position. The left blade is then introduced in a manner corresponding to the second blade, in the L. O. A.

What difficulty is then encountered?

The shank of the left blade will lie *over* the right blade, and the instrument cannot be locked.

How is this to be remedied?

Take hold of the handles separately, and bring each handle to the median line and beyond, until the handle of the right blade can be lifted over that of the left blade. They will then be in position for locking.

How are the forceps to be applied on the face presentation?

In the first and third positions, precisely as in the vertex, first and third. In the second and fourth positions, precisely as in the vertex, second and fourth.

May the forceps be used on any part but the head?

They have been used upon the breech, but are of doubtful utility as compared with other procedures, and not free from danger when so applied. The objections do not, however, apply to the *axis traction* forceps.

How are forceps applied in head-last labors?

If rotation has taken place, they should be applied to the side of the face, beneath the child's body. When the chin is in front, pass the forceps under the child's back and raise the handles. In extraction, when the head is flexed, the child's back should be carried toward the mother's back.

How should the forceps be applied when the chin is posterior?

In this case they should be passed under the abdomen, and the handles raised as before. In extraction, the body of the child is raised, its back directed toward the mother's abdomen.

What are the dangers of forceps delivery?

Principally, dangerous laceration of the maternal soft parts, increasing the danger of sepsis by presenting a large absorbing surface; increased shock. Considerable injury to the pelvic bones can be done. In the child harm may result from pressure on the skull; many cases of impaired mental condition may be traced to this source.

What are the indications for the use of the forceps?

1. For *delay* in the second stage of labor, arising from (*a*) uterine inertia; (*b*) any obstruction or disproportion of slight degree.
2. For delay in the first stage, rarely, as in (*a*) placenta prævia; (*b*) organic rigidity; (*c*) absence of natural dilating agents.
3. For rapid delivery, when required, by such complications as (*a*)

convulsions; (*b*) prolapse of the funis; (*c*) excessive uterine action menacing rupture.

4. For secondary purposes, as for (*a*) extraction of the child in the vaginal Cesarean section; (*b*) after rupture of the uterus; (*c*) for removal of tumors or foreign bodies from the maternal passages.

What is the principal circumstance demanding their use?

Uterine inertia, or insufficiency of the uterine contractions to complete the labor.

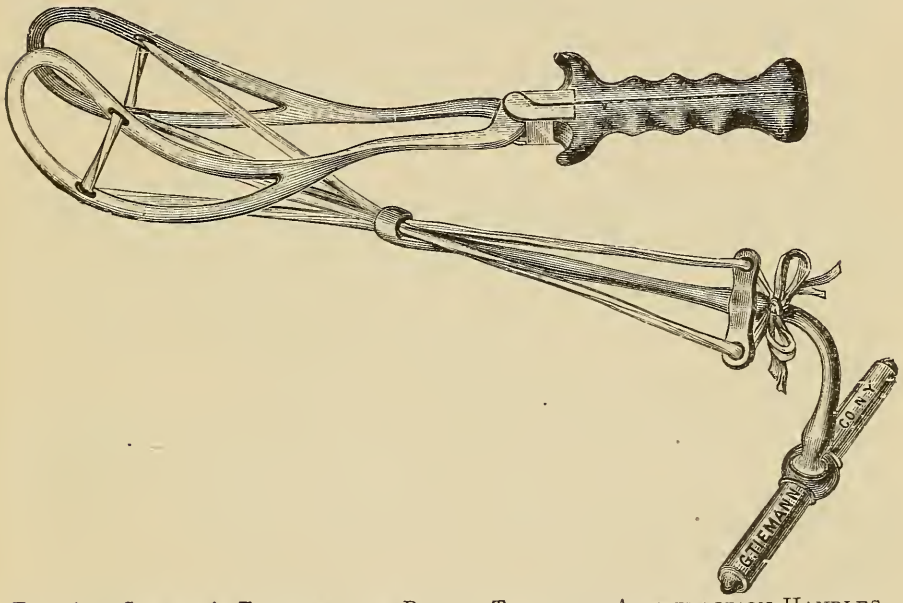

FIG. 68.—SIMPSON'S FORCEPS WITH POULET TAPES AND AXIS-TRACTION HANDLES.

How long should the second stage be allowed to continue before resorting to the forceps?

Rarely over one or two hours. It is irrational to subject the woman to long-continued pain and effort when we can harmlessly deliver by art.

What alternatives do we possess to the use of the forceps?

If the child is living, the mother in good condition and in a hospital, delivery by vaginal Cesarean section may be done if no great pelvic deformity exists or delivery by abdominal Cesarean section, may be preferred.

If the patient is in a house and cannot be in a hospital for any

reason or when the attendant does not possess the necessary surgical training to do these operations, he may resort to:

Version and embryotomy—

1. If prompt delivery is indicated in any case, we may employ version.
2. If the forceps fail to extract the child, or the pelvis is so deformed as to render their use impracticable, we may perform version (according to some authorities) or resort to embryotomy.
3. The last generation of physicians used a substitute, the *vectis*, which is simply a single blade of the forceps. It was used to slip over the head to flex it, or by alternately pressing on one side and the other to make traction. It can do nothing which cannot be better done by the forceps.

What is axis traction?

When the forceps are applied to the head high up, at the pelvic brim, or above the pelvic floor, it will be found that traction made in the usual way will have no effect, but must be made in another direction, *i.e.*, in the axis of the birth canal; that is, downward and backward, upward and forward, as the woman lies in bed.

What is necessary to make this form of traction?

A pulling power must be applied to the blades in such a way that traction can be made on them directly in a downward and backward direction; this is nearly at right angles with that exercised normally by the handles, which is upward and forward.

When and for what uses do we apply axis traction?

In cases when the woman's strength fails, the child is large, or a slight degree of pelvic contraction exists, when the head is above the pelvic brim, or within the brim and above the pelvic floor, before rotation has occurred, axis traction, properly applied, aids rotation and tends to flex the head.

How should the blades be applied?

In the same manner as the low application, except that the blades are applied in the oblique diameters of the pelvis if rotation has not occurred so as to grasp the side of the fetal head. The forceps and head may be allowed to rotate together, traction being made only by means of the traction bar or tapes, the handles being simply raised. As soon as the pelvic floor is reached, the traction can be made up-

ward and forward with the handles. No traction must be made by the handles before this time.

VERSION

What is version?

The operation by which the *presentation* of the child is changed; called, also, turning.

How many kinds of version are there?

1. As regards the *choice* of presentation there are two—
   (*a*) *cephalic*, in which the head is made to present; and
   (*b*) *podalic*, in which the breech is made to present.
2. As regards the *mode* by which it is effected, we have three—
   (*a*) *internal*, in which the hand is passed into the womb to effect the change;
   (*b*) *external*, in which the change is effected by manipulation through the abdominal walls only; and
   (*c*) *bipolar*, or combined, in which one hand upon the abdomen and two fingers (or more) internally are used.

What are the indications for version?

1. To convert a transverse presentation into one of the vertex or breech.
2. When rapid delivery is required, and the use of the forceps is not feasible, podalic version is indicated.
3. According to some authorities, to render delivery easier in deformed pelves. Internal version is always done to turn the child with the breech at the inlet. It is always therefore podalic. External version may be cephalic or podalic, usually the former. Bipolar version may be either cephalic or podalic.

What are the indications for internal version?

It is preferred in delivery of the second of twins, in central or partial placenta prævia and when for any reason a quick delivery is necessary. The os must be sufficiently dilated to admit the hand; the patient should be under an anesthetic with bowels and bladder well emptied. The membranes must be ruptured.

How is internal version performed?

1. The patient lying on her back with hips at the edge of the bed, the hand is cautiously passed into the uterus until a foot is reached and seized. As this foot is pulled down, the child is turned until the

breech presents. While this is being done, the other hand makes counter-pressure externally upon the fundus. According to some, version will be easier if we seize the foot which is furthest from us.

What cautions are necessary?

1. To introduce the hand slowly and gently, lest the womb be lacerated. Anesthesia is generally of service in promoting uterine relaxation.
2. Not to mistake a hand for a foot.

What posture assists in version?

When a transverse presentation is impacted, the woman may be placed in the knee-chest posture, which will aid in introducing the hand.

What are the indications for external version?

When the child is presenting either transversely or with the head in one or other iliac fossa. It is usually done before labor or at the beginning of it before the membranes have been ruptured.

How is external version performed?

1. By careful palpation we ascertain the exact position of the head and breech.
2. One hand placed over the head (on the abdomen) and the other over the breech, push the head and breech in opposite directions until one or the other is brought into the pelvic inlet. This is rarely practicable after the liquor amnii is evacuated.

What are the indications for bipolar version?

Substitution of one or the other pole of the fetus in a transverse presentation, central or partial placenta prævia, some cases of occipito-posterior position and occasionally prolapse of the umbilical cord. The membranes may or may not be ruptured. The os should be partially dilated.

How is bipolar version effected?

1. One hand is introduced into the vagina, and two fingers made to press against the presenting part.
2. The other hand is applied on the abdomen and pressed against the head or breech of the child, while the fingers of the other hand press the presenting part upward and to one side or the other. The hand introduced into the vagina should be the same

in name as the side of the pelvis toward which the fetal feet are directed. As soon as the presenting part is brought down, the membranes should be ruptured while a uterine contraction is in progress. The strictest asepsis must be used. This is also

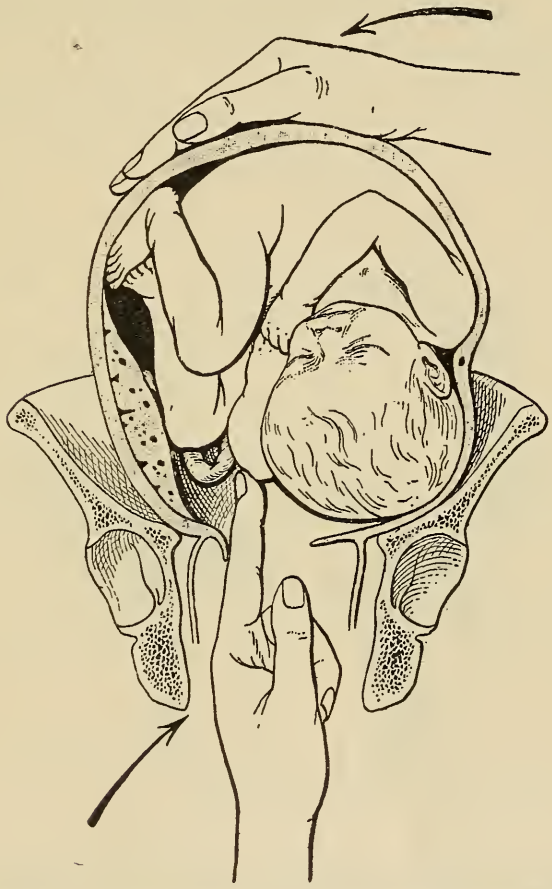

FIG. 69.—BIPOLAR OR COMBINED METHOD OF PODALIC VERSION—FIRST STAGE.—(*Edgar.*)

known as Braxton Hicks' bipolar method. This method should always be tried before internal version is resorted to.

Under what circumstances is version easy or difficult?

1. When there is much liquor amnii, and the uterus is uncontracted, it is easy of performance.

2. When the liquor amnii has drained away for some hours, when the womb is tonically or tetanically contracted, and when the child has been dead long enough for post-mortem rigidity to supervene, it is difficult and sometimes impossible.

What other methods have we besides version of delivering a child in transverse position?

If the mother is in good condition, the child living and strong and the patient is in a position to have hospital facilities the delivery can

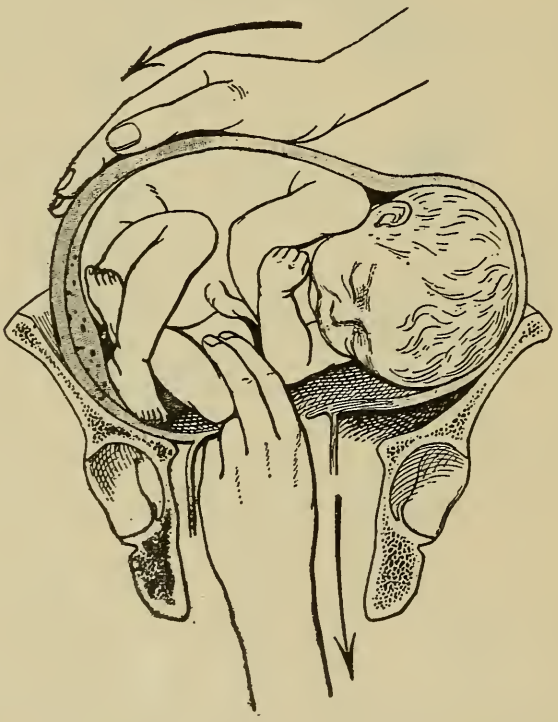

FIG. 70.—COMBINED METHOD OF PODALIC VERSION—SECOND STAGE.—(*Edgar.*)

frequently be quickly accomplished and with less danger to mother and child by delivering by abdominal section.

When version fails in a transverse presentation, what alternative operation have we?

Embryotomy.

EMBRYOTOMY

What is embryotomy?

The operation by which the size of the child is reduced by cutting and mutilation. It is now restricted to mutilation of the body; when applied to the head it is called craniotomy.

What are the steps in performing embryotomy on the transverse presentations?

The patient having been put under an anesthetic, and a vaginal douche of 1:5000 solution of bichlorid of mercury or other efficient antiseptic—

1. An assistant places his hands on the abdomen and presses the child downward, so as to steady it.
2. A perforator is introduced into the vagina, and made to perforate the chest, and to divide several ribs. Care should be taken to guard the sharp edges of the perforator with two fingers, while introducing and using it.
3. A blunt hook, crotchet, or other instrument is introduced into the chest through the perforation, and the viscera broken up and removed piecemeal. This is called evisceration.
4. The body may then be doubled up and drawn down by a blunt hook or embryotomy forceps.
5. In a few cases it is necessary to decapitate the child before it can be extracted. This may be done by instruments invented for the purpose, or by improvised methods, if the operator is ingenious.

What is craniotomy?

The operation by which the head is lessened in size.

1. The head is pressed down and steadied by an assistant.
2. The head is perforated.
3. The brain is broken up completely, and, if necessary, removed by syringing out the cranial cavity.
4. Traction is made upon the head by a finger hooked into the perforation, by craniotomy forceps, or by any suitable instrument, and the head collapses and is drawn out. If not sufficiently reduced in size by these steps, we proceed to cranioclasm.

What is cranioclasm?

The operation by which the vault of the cranium is removed.

1. Craniotomy is performed as above.

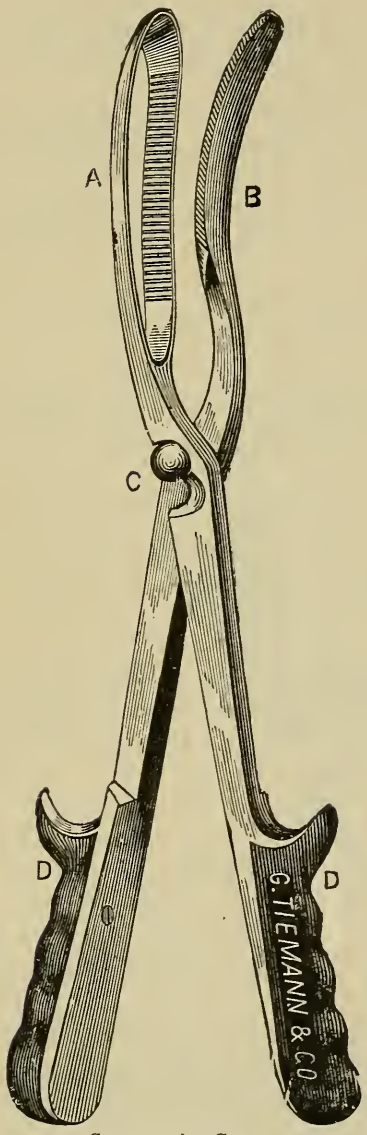

FIG. 71.—SIMPSON'S CRANIOCLAST.

2. With the cranioclast (or craniotomy forceps) seize an edge of bone at the perforation, and wrench off as large a piece as possible, which is then cautiously withdrawn. This is repeated until the vault of the cranium is removed.
3. The head is then tilted, so that the craniotomy forceps can seize the face, and the thin base of the skull is drawn down through the pelvis.

What cautions are necessary?

1. To preserve the scalp, so that the sharp edges of bone may be covered while it is withdrawn. Therefore, the scalp is to be dissected up before using the cranioclast, and its blades placed one inside the skull, and the other between and scalp and outside of the skull.
2. To guard the edges of fragments of bone with two fingers while withdrawing them.
3. To preserve the most strict aseptic cleanliness.

If even the base of the skull is too large to pass, what alternative have we?

Cephalotripsy, in which a powerful pair of forceps (the cephalotribe) is applied, and made to crush the base. Cephalotripsy may also be used before resorting to cranioclasm, but perforation of the cranium should always precede the application of the cephalotribe.

CESAREAN SECTION

What is the Cesarean section?

Cœlio-hysterotomy, or the removal of the child through an incision made in the abdominal walls and uterus. The term is sometimes incorrectly applied to simple gastrotomy (laparotomy) after rupture of the uterus.

What are the indications for the Cesarean section?

1. A pelvis contracted to 2 inches in the conjugate, or obstructed by tumors, or other insurmountable obstacles to delivery by the natural way. The indications for the operation are frequently extended to include cases of faulty presentation, central or partial

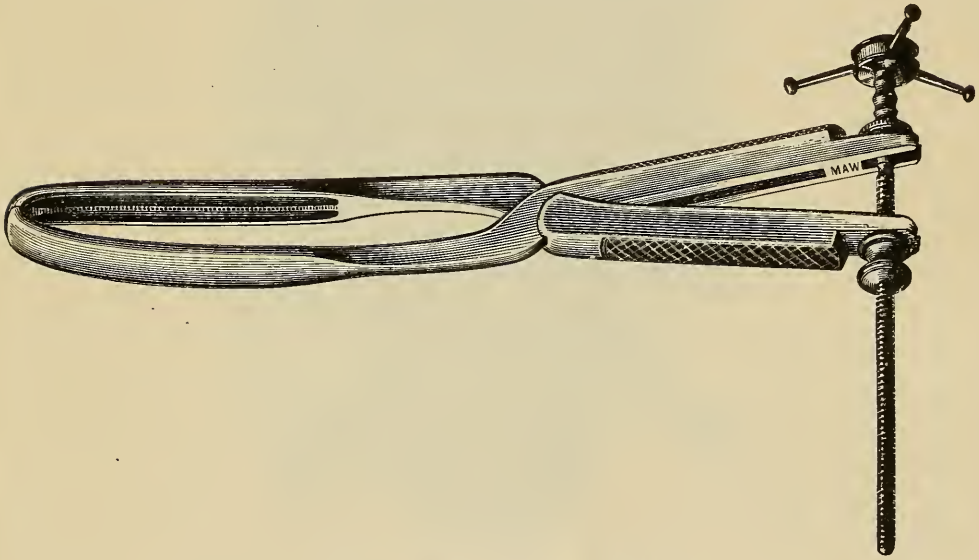

FIG. 72.—HICKS' CEPHALOTRIBE.

placenta prævia, transverse position and eclampsia providing hospital facilities are at hand, the mother is in good condition free from possibilities of infection and the child living and strong.

2. For the rapid delivery of a supposed living child after the death of the mother. Children have been saved when the mother had been dead for more than an hour.

What are the steps in the Cesarean section?

1. Previous to the operation the patient must have a full bath, followed by a thorough scrubbing of the abdomen with hot water

and soap, rinsing with hot water and scrubbing with 1 : 1000 bichlorid of mercury. An antiseptic dressing should be applied over the lower part of abdomen; the bowels and bladder are to be thoroughly emptied. Immediately before the operation the abdomen must be prepared as follows:

(*a*) Wash the field of operation thoroughly with soap and water.

(*b*) With alcohol or ether.

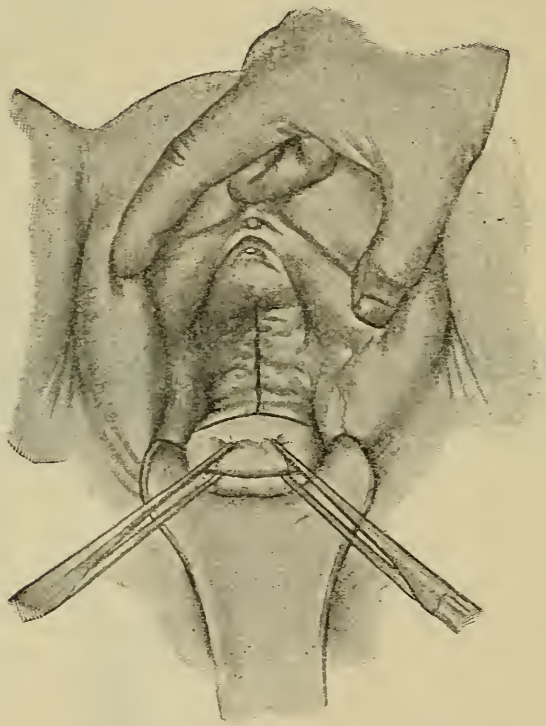

FIG. 73.—VAGINAL CESAREAN SECTION.

Shows initial incision. Transverse incision one and a half inches through mucous membrane at utero-vaginal junction and vertical incision extending from the middle point of the transverse incision longitudinally downward through mucous membrane of anterior vaginal wall to a point immediately below the urethra, thus making a "T" incision.—(*Edgar.*)

(*c*) With a solution of 1 : 1000 bichlorid of mercury.

The hands and arms of the operator prepared in the same manner, the finger nails being carefully brushed and cleaned.

2. The operator stands by the patient's side, with his face toward her feet, and begins to make his incision near the symphysis. (To avoid cutting early into the placental site.)

3. An incision is made, layer by layer, in the linea alba, from near the pubes to the umbilicus, and, if necessary, continued further up and to the left of the navel.
4. The womb is cautiously incised, either in situ or by bringing it out of the abdomen. In the former case an assistant should keep the abdominal walls in close contact with its surface; in the latter it should be enveloped with a warm aseptic towel, and be held nearly at right angles to the abdomen. (Lusk.)

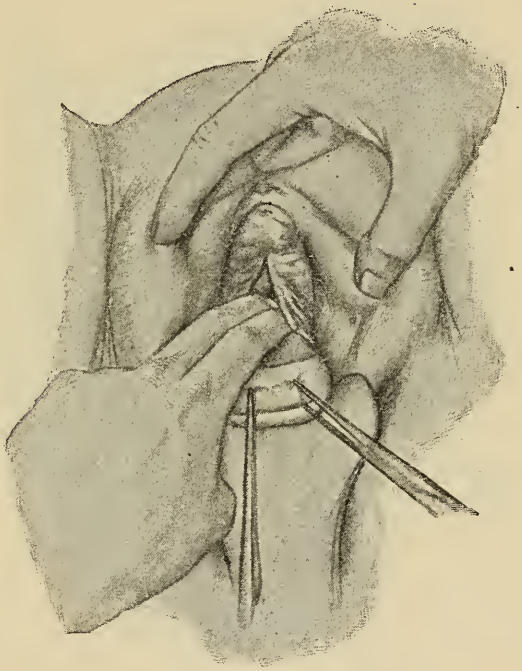

FIG. 74.—VAGINAL CESAREAN SECTION.
The flaps of the incision are turned back with the finger or blunt dissector and the bladder is stripped away from the cervix.—(*Edgar.*)

By a rubber tube or by manual assistance, pressure should be made on the lower segment, to prevent hemorrhage.

5. As soon as the uterine cavity is opened the membranes must be instantly ruptured and the child quickly extracted by grasping it by the feet or shoulder.
6. The after-birth is delivered.
7. The abdominal cavity is to be thoroughly sponged out and the

uterine incision closed by one or two sets of sutures of wire, silk, or catgut. Lusk advises a stronger one of wire, silk, or catgut for the muscular structures, and a fine one of silk or catgut for the peritoneal borders.

8. The abdominal cavity is again carefully cleansed of all blood and fluids by warm distilled well-boiled water or sterilized normal saline solution.
9. The abdominal incision is closed by suture.

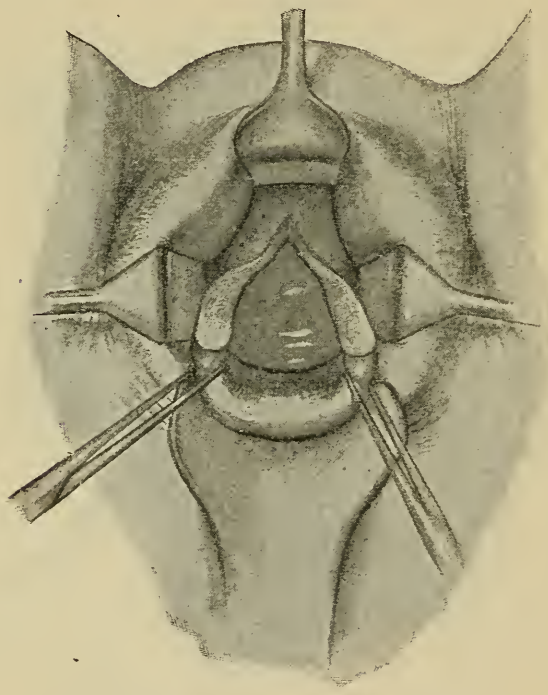

FIG. 75.—VAGINAL CESAREAN SECTION.
The anterior wall of cervix and lower uterine segment are bisected in the median line up to the reflection of the bladder, exposing the amniotic bag.—(*Edgar.*)

10. The incision is dressed as after any other abdominal operation.
11. The operation and subsequent treatment should be conducted with strict antiseptic precautions.

What instruments are required for an abdominal Cesarean section?

Two scalpels, curved needles and a needle holder, suture material, half a dozen hemostatic forceps, a pair of blunt-pointed scissors, a large fountain syringe or glass irrigator, bichlorid or plain sterile

gauze for gauze sponges, or natural sponge carefully made aseptic, plenty of boiled water, and aseptic towels.

What is vaginal Cesarean section?

It is a deep incision of the anterior cervical wall extending beyond the internal os and into the lower uterine segment followed by the delivery of the fetus through this opening by forceps or version (Edgar).

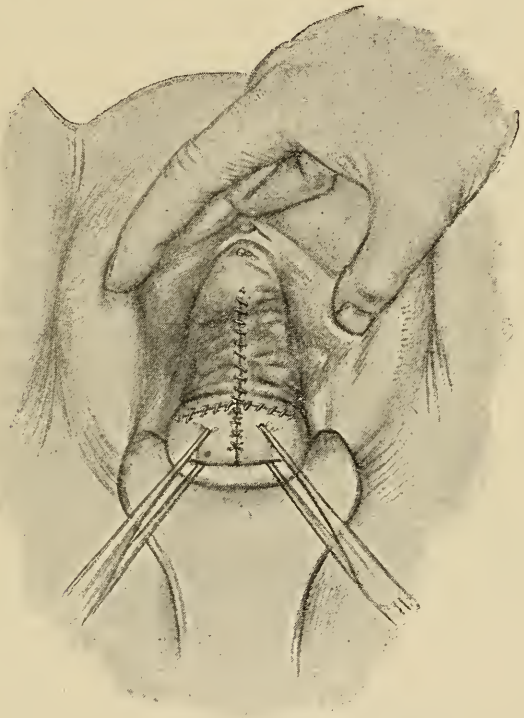

FIG. 76.—VAGINAL CESAREAN SECTION.

The incisions in the cervix and lower uterine segment are closed with catgut after emptying of the uterus, and the vaginal incisions are brought together over these with catgut.—(*Edgar.*)

What are the indications for vaginal Cesarean section?

1. Eclampsia where rapid delivery is required especially if the cervix cannot be dilated for ordinary delivery.
2. Cardiac diseases.
3. Stenosis of the cervix.
4. Occasionally in placenta praevia. It is contraindicated in contracted pelvis.

How is vaginal Cesarean section performed?

Operation. Instruments required: 1 perineal and three long vaginal retractors, 4 bullet forceps, strong straight scissors, artery clamps, needle holder, 6 full curved needles, chromic catgut, vaginal dressings. (Description of this operation is from Edgar's Obstetrics.)

First step. The perineum is depressed with a broad speculum, and the cervix grasped with two tenaculum forceps, placed one on each side of the median line, about 1/2 inch apart. The cervix is drawn downward and backward into the vulvar outlet, and the mucous membrane at the uterovaginal junction is incised laterally to the extent of 1 1/2 inch. Some add a second incision at right angles to the above and extending from the middle point of the transverse incision longitudinally downward through the mucous membrane of the anterior vaginal wall, thus making a "T" incision.

Second step. The bladder is now stripped away by the finger and blunt dissection up to the point of deflection of the peritoneum.

Third step. A long narrow-bladed speculum is now inserted which elevates the peritoneum and exposes to view the length of the cervix and a portion of the lower uterine segment.

Fourth step. With blunt-pointed straight scissors the cervix is incised anteriorly in the median line through the internal os.

Fifth step. The incision in the uterus is now stretched either with two index fingers or with one hand inserted into the vagina after removing all instruments.

Sixth step. Delivery of the fetus by forceps or version, preferably the latter, extract the placenta and membranes manually. Wash out uterine cavity with normal saline solution. Pack with iodoform or sterile gauze.

Seventh step. Retract perineum, catch cervix with bullet forceps and the long narrow retractor placed to hold up the bladder and peritoneum anteriorly. The incision in the cervix is now closed with interrupted suture of No. 3, 20-day chromic catgut and the vaginal incision with No. 2 plain catgut. The external portion of the cervical wound should be left in order to prevent undue contraction and improper uterine drainage.

What is Porro's method?

A modification of the Cesarean section, in which the uterus is removed after the child is delivered, and the stump treated by leaving it outside the peritoneal cavity, fixing it at the lower end of the

abdominal incision. Up to a point following the delivery of the child it is done in the same manner as cœlio-hysterotomy. After this a clamp is placed across the uterus at the lower border of the lower uterine segment and the body amputated above the clamp. The clamp holds the cervical stump in the lower angle of the wound. The abdominal peritoneum is now closed (leaving room for drainage) by sutures of catgut and is united to the peritoneum of the cervical stump. Gauze is freely packed around both stump and the clamp holding it. Finally the stump becomes detached from the clamp but is adherent through to the surrounding tissues which hold it in place.

What are the indications for Porro's operation?

The operation is done in obstetrics in cases where there is a possibility that the uterus is septic, when haste is required or when a simple form of hysterectomy is required, the pelvis being too small to admit of the child being born by the natural way.

What is cœlio-hysterectomy?

By cœlio-hysterectomy is understood abdominal incision followed by amputation of the body of the uterus at the junction of the lower uterine segment with the cervix. (Davis.)

What are the indications for cœlio-hysterectomy in obstetrics?

When the pelvis is too small to admit of the child being born by the natural way; when the uterus contains fibroids; when the pelvis is so small that it is unsafe for the patient to again become pregnant, or in cases of severe chronic disease where future childbirths would endanger the life of the patient.

What is symphysiotomy?

A cutting, partially or completely, through the pubic joint in order to facilitate delivery by increasing the size of the pelvic cavity.

When is the operation indicated?

According to most authorities, symphysiotomy is indicated in cases of contracted pelves when the true conjugate is as low as 2 3/4 inches to 3 1/2 inches. Below 2 3/4 inches the operation is difficult. Many operators believe that forceps and version should be tried before resorting to symphysiotomy. The operation has also been used in cases in which the birth has been hindered by tumors, etc.

When is Cesarean section preferable to symphysiotomy?

In cases where the conjugata vera is below 2 3/4 inches. Garrigues recommends that symphysiotomy should be done in cases

where the diagonal conjugate is 3 1/4 to 3 3/4 inches (80 to 90 millimeters).

What is the amount of space gained by section of the pubic joint?

The amount of increase is principally in the transverse diameter, although there is some enlargement of the obliques and antero-posterior diameters. The gain in space is 2 millimeters (2/25 of an inch) for every centimeter (2/5 of an inch) of separation of the divided ends of the pubic joint. With a separation of 6–7 centimeters (2 3/4 inches), the increase is about 14 millimeters or 1/2 an inch.

How far can the pubic joint be safely separated?

Not more than 2 3/4 inches (Garrigues). A greater separation than this endangers the sacro-iliac joint.

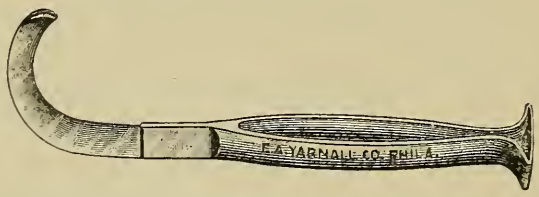

FIG. 77.—GALBIATI'S FALCETTA.

How is the operation done?

A symphysiotomy is best begun at the time of complete dilatation. The patient lying on her back with thighs flexed on abdomen, and under the influence of an anesthetic, the pubic region should be shaved, and washed with soap and water, alcohol and bichlorid of mercury 1:2000. An incision 3 or 4 inches long should be made, beginning at the upper end of the symphysis and ending at the root of the clitoris. The subcutaneous tissue should be cut through, bleeding being checked by pads of iodoform gauze, unless severe, when the wounded arteries must be found and ligated. A metal catheter should now be inserted into the bladder and the urethra drawn strongly to the right; the bladder must be empty. The symphysis having been uncovered, a probe-pointed bistoury, or, better, the Galbiati symphysiotomy knife (falcetta), is introduced, guarded by the left index finger, with its edge against the posterior surface of the symphysis. The joint is severed by passing the knife in a direction from behind, forward and upward. Should the joint be ossified, a chain saw will be found of use. An assistant

should now make moderate pressure on each trochanter, to prevent injury of the sacro-iliac joints. As to the delivery of the child, authors are divided, many believing that forceps should be used until the head reaches the pelvic floor, when the actual birth should be left to nature. Delivery of the placenta should be accomplished as speedily as possible. If the child be asphyxiated, it should be treated in the usual way (see asphyxia). Firm pressure should now be made on the trochanters, thus bringing the severed ends of the joint together; care should be taken, while this is being done, to hold the bladder and urethra, so that they will not be caught between the ends of bone. Sutures of silver wire, silk, or silk-worm gut should be inserted through the cartilage, or, as some recommend, through the fibrous tissue in front of the bone; one or two stitches of silk or catgut are enough to close the wound. Drainage may or may not be used. After the operation a copious vaginal douche of some antiseptic fluid should be given, the field of operation being dusted over with iodoform powder and covered with an aseptic dressing. A firm bandage should be placed around the hips, and should be removed as seldom as possible. It is best that the patient lie with legs outstretched, and on her back.

What is the after-treatment of symphysiotomy?

The same as in any other obstetrical case in which an operation has been done. The strictest asepsis must be maintained; the bowels should be opened every day and the urine withdrawn every six hours by means of a catheter, or a permanent catheter may be left in the bladder and connected by a tube with a vessel under the bed. This allows the bladder to empty itself without disturbing the patient. The bladder may occasionally be irrigated with a mild solution of boracic acid. A light and nutritious diet should be given her.

What is the prognosis of symphysiotomy?

As to the mortality of symphysiotomy, authors differ; but in summing up the results of a number of operators, the maternal death-rate will range from 12 to 18 per cent. (Davis); the fetal is very small. Symphysiotomy is an operation in which the child has undoubted preference.

What is ischio-pubiotomy?

It consists of severing the horizontal ramus of the pubes from

the symphysis. It is said to have been used with success in cases of obliquely contracted pelves.

INDUCTION OF LABOR

What is the induction of premature labor?

The operation by which labor is brought on at any time before full term and after the period of viability.

What are the indications for its performance?

1. In deformed pelves, a child may be delivered alive if labor is induced at seven or eight months of pregnancy, which would have to be sacrificed by craniotomy, if allowed to develop until full term.
2. If the mother's life is endangered by vomiting, convulsions, or other causes, the operation is sometimes performed.

How is the operation conducted?

(Barnes' method). 1. Pass an elastic bougie 6 or 7 inches into the uterus; coil up the remainder of the instrument in the vagina, to keep it in place. Do this in the evening.

2. Next morning proceed to dilate the cervix by Barnes' (or Molesworth's) dilators, until it will admit several fingers.
3. Rupture the membranes and reapply the dilator.
4. Allow the natural efforts to complete delivery, or use the forceps or version.
5. (Thomas.) Pack the *child* in cotton or wool as soon as born, and maintain a suitable temperature by artificial heat, applied is various ways.

THE PUERPERAL PERIOD

What is the period after delivery called?

The *lying-in* period, the *puerperal state*, or the *period of involution*, because after labor the uterus undergoes the process of involution.

What is involution?

The process by which the womb returns to its original size and condition. The tissues of the womb undergo a form of fatty degeneration. As the products of this change are partly absorbed and partly transuded and discharged from the body, the structure

of the uterus becomes condensed until it has become nearly of the same size and condition as before pregnancy. The same change takes place in all the structures (ligaments, etc.) enlarged by pregnancy.

How long a time is required for this process?

By the tenth day the womb is so diminished as to be entirely within the pelvis, and the fundus is not to be felt above the inlet. After this, involution continues at a slower rate, being completed in about twelve weeks.

What irregularities are met with?

1. *Sub-involution;* it may be protracted by inflammation or other concurrent disease, and remain enlarged permanently or for a long time.
2. *Super-involution;* it may be rapid and excessive, leading to atrophy of the womb, but this is very rare.

What are the causes of sub-involution?

1. Any constitutional disease affecting the constituents of the blood.
2. Pelvic tumors or previous attack of metritis or endometritis.
3. Uterine displacements.
4. Getting up too soon after delivery.
5. Retained secundines.
6. Sexual intercourse too soon after labor.
7. Mild septic infection (metritis) following labor.
8. Laceration of the cervix, pelvic floor or perineum.

What are the symptoms of sub-involution?

1. Heaviness in the pelvis.
2. Pain the back and down the thighs.
3. Headache.
4. A slight temperature rise.
5. A previously serous lochia changes to bloody.
6. Constipation.

The *diagnosis* is made from these symptoms and finding the uterus large, flabby and possibly retro-verted or retro-flexed. It is apt to be painful to the touch.

What is the treatment?

Rest in bed, correction of displacements by a suitable pessary. Not infrequently irrigation of the vagina with perfectly sterile hot salt

solution will do good; but if great care as to cleanliness is not used these had better not be used. Tonics such as strychnin, cinchona, or small doses of quinine are useful and ergot with or without the fluid extract of hydrastis will aid in the contraction of the uterus.

What are the lochia?

The "flow" is the discharge from the uterus and vagina which occurs after labor, and, to some extent, until the womb is completely involuted.

What are its properties?

It is a rather thick, albuminous fluid, containing oil globules, epithelial cells, blood corpuscles, and granular débris from the uterus. During the first day after labor it is of a *red* color, from the presence of blood in excess (or it may be blood alone immediately after labor). This may continue for several days, especially if any clots have been retained in the uterus, after which it becomes straw-colored, and finally clear and colorless. In health it has no odor, or nearly none.

What is the nature of a lochial fluid?

It is an excrementitious product, and readily decomposes at the temperature of the body or a little higher.

What is the amount of the lochia?

At first it varies from one-half ounce to several ounces per diem. It is gradually diminished, and after the tenth day is usually scarcely perceptible, being little more than the natural secretion of the parts. In some women it is very scanty, and ceases after a few hours or a day or two, while in others it may continue for weeks.

What is the normal condition as to health after labor?

The majority of women feel in good health, being only a little tired and sore, and in a few days feel competent to arise and resume their avocations.

Should they be permitted to do so?

No. Rest and quiet are essential to guard against the dangers incident to this period.

How long should the woman be kept in bed and at rest?

Until the womb has retreated within the pelvis, and not allowed to work until involution is complete. Before this, the womb is enlarged and softened, and is subject to displacements and flexions.

What physical peculiarities are noted in this period?

1. The pulse becomes slow, falling to 60 beats per minute, or less.
2. The temperature is elevated from 0.5° to 1° Fahr.
3. The skin is more active and perspiration more free.
4. The urine is increased in amount, in specific gravity, and urates.
5. The bowels are constipated.
6. The breasts secrete milk.

What general care should be given a patient during the puerperal state?

The patient must be in bed, and should remain there for at least ten days. During the first forty-eight hours she should be on her back, after that she may turn on her side. Long continued laying on the back may favor retrodisplacements if uterine involution is slow. The patient's temperature, pulse and respiration should be taken frequently enough to study the case and a record should be made of it. If the labor has been hard and if the patient cannot evacuate the bladder she may be catheterized every eight hours for a few days. The greatest care should be used as to the catheter otherwise the bladder may become infected. Usually in tweny-four hours she can pass urine herself. Unless there are some special indications for them, vaginal douches are not used after labor, but the external genital organs, the groins and buttocks should be cleansed by pouring over them (the patient lying on bed-pan) bichlorid solution 1 : 5000 or lysol solution 1 per cent. every day and besides after urination a defecation. The vulva should be covered by a suitable pad of gauze. A well-fitting abdominal binder is usually employed and the breasts are supported by a suitable binder pinned from below upward and supported by shoulder straps to prevent its sagging toward the waist. The patient should be in a quiet room and free from disturbing influences. The diet should be liquid for the first twenty-four hours. Soft foods may then be given until the end of the sixth day, then gradually a solid diet may be resumed. At the end of the first twenty-four hours the bowels may be moved by a grain or two of calomel followed by a saline and a high enema of 2 to 4 quarts of soapsuds or normal salt solution. Afterward, simple laxatives should be employed, care being taken that these should not be such as to influence the milk. Rectal enemata are usually sufficient for this purpose or an occasional dose of compound licorice powder. The nipples should be washed with boric acid solution

before and after each time the child nurses and should be kept covered by a small square of sterile gauze held in place by a binder such as has been described.

Fig. 78.—Abdominal Binder and Breast Support for the Normal Puerperium. The retention straps connecting the lower edge of the binder to a band about the thighs are used only when the binder shows a tendency to slip up above the pelvis.—(*Edgar.*)

If the patient has had a discharge previous to labor a study of its bacteriologic content should be in order. As a rule, many of these do not need douching and frequently it is better to wait until after the puerperal period when more active treatment can be given to the uterine condition causing the discharge. When douches are necessary to cleanse the parts of such a discharge they should be given by the physician himself. Usually one a day is quite sufficient.

How should a puerperal woman be fed?

During the first twenty-four hours a light diet of broth, milk-toast, milk, or other easily digested articles. It is well to feed the patient once in every four to six hours. From the third day the

limit of diet can be enlarged; all pastry and indigestible articles, however, must be prohibited. During the period of lactation her diet should be directed in such a way as to produce as much milk as possible, and at the same time nourish the mother.

How soon after labor is milk secreted?

To a slight extent during pregnancy, and some is to be found in the breasts just after labor. But the secretion is not fully established for from thirty-six to seventy-two hours, beginning suddenly in some and gradually in others.

What is the nature of milk?

It is an emulsion of oil globules in an albuminous fluid, containing salts in solution. When of good quality it is rather thick (a drop

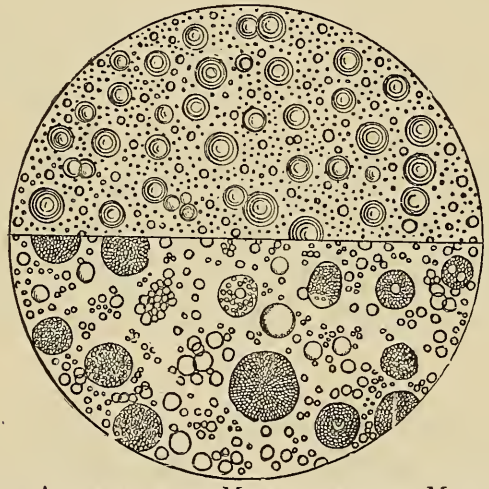

Fig. 79.—Appearance of Milk under the Microscope.
Above transverse line can be seen the fat globules of the milk; below. the colostrum corpuscles.

adhering to the finger nail when inverted), of a bluish tinge and sweetish taste. The milk found in the breasts just after labor differs from the subsequent secretion, in being richer in fatty matters and slightly purgative to the child. It is called colostrum.

What is weid, or milk fever?

An irritative fever, lasting from several hours to one or two days, and occurring in women in whom the secretion of milk is suddenly established. It is due to reflex irritation, from the sudden develop-

ment of secretory changes in the breasts. Clinically, it is distinguished by a sudden rise in temperature, preceded by a slight rigor and followed by free diaphoresis, it is rarely seen but when it does occur must be distinguished from a mild sapremia.

What rules should be observed concerning lactation?

1. During the first month the baby should nurse REGULARLY, every two hours during the day and once or twice at night; during the next month the intervals may be lengthened to three hours, and afterward to four hours. Observance of this rule will save much trouble.
2. The nipple should be clean, drawn out, and erect when offered to the child, especially at first.
3. After nursing, the nipple should be washed with boric acid solution, dried, and anointed with cacao butter or other unguent.
4. If the breasts are large and pendulous, they should be supported by a bandage whenever the woman is in the upright posture.

What attention does the urine require after labor?

Retention is apt to occur after long labors, from temporary paralysis of the bladder and urethra, from pressure. The catheter should then be passed, within twelve hours after labor, and, if necessary, once every eight hours afterward, until recovery. Hot cloths are also useful when the retention is due to local swelling and spasm.

How should the catheter be passed in the female?

1. Place the woman on her back, with the knees drawn up.
2. Introduce the finger into the vagina, passing it from below upward, over the perineum and posterior commissure into the vulva.
3. Partially withdraw the finger, pressing slightly on the anterior wall until its tip arrives at the orifice of the vagina.
4. With the other hand pass the catheter along the finger to the tip, immediately above which is the meatus.

If this fails, the meatus must be sought for by the tip of the finger, which is to be depressed as soon as the catheter arrives at the vestibule.

Do not try to pass the catheter by the sense of touch alone, if not promptly successful, but remove the bedclothes, and *look* for the meatus. The catheter should be sterilized by boiling and the parts asepticized before introducing.

What attentions do the bowels require after labor?

Owing to the constipation, it is usually necessary to give a purgative on the third or fourth day after labor. This will not be needed if the bowels move spontaneously, and if there seems to be a slight inclination to a movement an enema will be preferable.

What rectal difficulty is common at this time?

Hemorrhoids. These should be carefully replaced if extruded, after labor; and during convalescence an attempt may be made to cure them by medication.

What diseases are especially liable to occur in this period?

The lying-in woman is liable to septicemia, peritonitis, and pelvic inflammations, thrombosis, phlebitis, pyemia, and mastitis.

What is puerperal septicemia?

1. A fever produced by the absorption of septic matter into the system (Playfair).
2. By the term septic infection is understood the development in the mother's tissues during labor of poisonous material (*a*) formed from the cellular elements of her tissues (sapræmia) or (*b*) from the introduction within her body of poisonous germs and their products from without—direct septic infection (Davis).
3. It may occur in a severe and acute form, or in a mild and subacute form.
4. It is often associated with inflammations, by which its course is greatly modified.
5. The various conditions resulting from the union of septicemia and inflammations are grouped by some under the name of puerperal fever.

What are the causes of sapræmia?

It most frequently occurs as the result of a slight absorption of the products of necrotic tissues the result of bruising of the maternal soft parts during a protracted labor.

What are the symptoms of the lighter form of sepsis (sapræmia)?

It usually begins about the third day, although it may make its appearance earlier. It is ushered in by a chill, not generally of a severe character; this is followed by some fever, the temperature reaching 101° to 103° F. The temperature gradually falls after a short time, its decline being accompanied by free perspiration and

without chills. Some pain may be felt over the uterus, and the lochia may be lessened or temporarily arrested and has an odor.

What is the treatment of sapræmia?

Protracted labors should be prevented by prompt delivery, thus preventing bruising of the tissues. All laceration of the soft parts must be promptly closed by sutures and under strict antiseptic precautions. The strictest surgical asepsis should be used on the external genital organs, and the patient's general health stimulated by tonics and good food.

What are the causes of septicemia (direct infection)?

1. Puerperal septicemia is believed to be due to a specific microbe, which enters the body through a traumatic surface.
2. The poison is contagious, and, under favorable circumstances, multiples with great rapidity in the body.
3. It is heterogenetic, never autogenetic, and may be conveyed to the abraded surface either by—
   (*a*) the atmosphere;
   (*b*) towels or sponges which have been used in other cases or to cleanse suppurating wounds, and have not been antisepticized;
   (*c*) the doctor or nurse, who has been attending patients with septicemia, suppurating wounds, erysipelas, diphtheria, or other zymotic diseases.
4. The poison can enter only an abraded surface.
5. The retention and decomposition of fragments of the placenta or membranes, clots in the uterus, or retained lochia will not produce the disease, but will favor its development by forming a suitable nidus for the microōrganisms on which the disease depends.

What are the symptoms and course of acute septicemia?

1. Slight chilliness; no rigor, unless complicated by inflammation. Nausea and vomiting.
2. High fever, usually developed rapidly, and always lower in the morning than at night. } Temperature, 103° to 109° F. Pulse, 120 to 150.
3. The pain varies *much with the seat of the maximum of inflammation;* when this is near the peritoneum, it is most intense; in other cases it may vary from a slight tenderness in the hypogastrium to scarcely any pain at all.

4. Suppression of the lochia or a fetid discharge in some cases.
5. Mind usually unimpaired, and the patient either cheerful or indifferent.
6. Face anxious and usually somewhat jaundiced. The tongue is dry, parched, and heavily coated.
7. The typhoid state usually precedes a fatal termination, which occurs within a week, unless recovery takes place. The above symptoms are those found most frequently in *all* forms of septicemia. Other symptoms there may be peculiar to organs most involved or to the type of infection, etc.

What is the pathology of pueperal septicemia?

The pathological lesions vary greatly according to the nature of the infection, the organ or organs involved, the bacteria and their virulence. There may be but a slight membrane on a small laceration or a furious and quickly fatal (sepsis foudroyonte) form. As a rule, the most virulent and quick are those produced by the streptococcus. Here the attack may be so quick that the organs first invaded will show comparatively little change. The mildest are apt to be those produced by the staphylococcus or colon bacillus, these former tending frequently to later localization in some part of the genital tract or as abscesses in other parts of the body. However, in a large proportion, the invasion occurs through the uterus and we have the characteristic changes of a septic endometritis or metritis. There may be also lesions of the vulva or vagina (vulvitis or vaginitis). The membrane so frequently found over septic lacerations may contain the pus cocci or, in some cases the true diphtheria microörganisms have been found. The septic process may invade the tubes producing salpingitis, peritonitis or a general pyemia or thrombosis of the pelvic veins or of the leg (phlegmasia alba dolens).

What are the symptoms of chronic septicemia?

1. The patient remains weak, and has little appetite.
2. The tongue is pale and flabby, and lightly coated, if at all.
3. Slight fever, of intermittent type, is present.
4. The urine is high-colored, and constipation exists.

What are the indications for treatment in acute septicemia?

The treatment must be divided into prophylactic and curative.

Prophylactic treatment.

If proper attention is paid to a pregnant and parturient woman

there need be few cases of septicemia. The previous antiseptic care would include the care of the bowels during pregnancy and labor; antiseptic care of the patient during labor particularly in the second and third stages. The physician's responsibility to his patient is his own cleanliness.

Curative treatment.

1. If the attack begins in a sutured perineum, the stitches should be cut and the parts touched with pure carbolic acid or tincture of iodine.
2. If the infection has started in the uterus, and the patient is seen early, if the uterus contains much débris, it should be gently curetted to remove all decomposed materials. It should then be thoroughly irrigated with a 1:12,000 bichlorid solution: a mixture of creoline or lysol, ℥j to the quart, or sterilized normal salt solution will do very well. It should then be lightly packed with gauze, to aid drainage, or a suppository of iodoform may be inserted. In many cases intrauterine irrigation of normal salt solution without curettage is much safer.
3. Whisky administered with a free hand.
4. Tonic doses of strychnin or quinin, are also useful.
5. The bowels should be thoroughly opened by calomel, grs. ij to v, with soda bicarb., followed by a saline or enema.
6. Some good may be obtained by injection into the blood or subcutaneously of normal salt solution.
7. Culture should be taken from the lochia, the interior of the uterus or in some cases from the blood and, following this suggestion, autogenous vaccines or antistreptococcic serum may do good in some cases.
8. Later if localization occurs in any part of the pelvis as shown by abscesses the abdomen should be opened and then drained.

What are the indications for treatment in chronic septicemia?

1. To improve the action of the excretory apparatus by such agents as calomel, ipecac, and saline laxatives.
2. The salicylates or quinine, in small doses; the main dependence is to be placed on alcohol.

What are the indications for treatment in inflammations, complicated with septicemia?

The septicemia is to be regarded as the chief trouble, and the inflammation combated as a secondary matter.

What is uterine thrombosis?

The formation of clots in the uterine sinuses, due to imperfect contraction of the womb after delivery.

What results may follow from thrombosis?

1. Detachment of fragments, and formation of emboli in other structures, as in the lungs, brain, etc., leading to inflammations in the obstructed organs, metastatic abscesses.
2. Purulent liquefaction of the thrombus and subsequent escape of pus into the circulation, causing pyemia.
3. Extension of the thrombus into consecutive veins, causing phlebitis.

What is phlegmasia alba dolens?

Also called "milk-leg," is an inflammation of the cellular tissue of the thigh and leg, usually associated with femoral or crural phlebitis. Thrombosis of the vein may precede or coexist, but is not always present.

What are the symptoms of "milk-leg"?

It begins usually in the second week with—

1. Irregular chilliness and malaise for several days.
2. Pain, of a dragging character, in the leg and abdomen.
3. A distinct rigor, and swelling of the leg.
4. Fever of a remittent type, changing to intermittent as recovery advances, or becoming continuous in grave cases.

What peculiarities attend the swelling?

1. The skin is white and tense.
2. A red streak marks the line of the vein when phlebitis is present.
3. Later, the vein feels like a hard cord when palpated.

What are the results of "milk-leg"?

1. It may end in complete resolution.
2. An abscess is formed along the vein, and discharges.
3. Gangrene and septicemia may be developed.
4. If thrombosis is present, emboli and pyemia may occur.

In all cases recovery is slow, and the leg is apt to remain weak and become edematous, from permanent obstruction of the vein.

What is the treatment in "milk-leg"?

1. To control inflammation.
2. To relieve pain.
3. To support the patient's strength.

The first can be best effected by the use of atropia, in a 1 per cent. solution, applied to the parts with a cloth, or by belladonna ointment. Warm fomentations are useful, or a lotion of lead water and laudanum, or witch-hazel, applied warm, is also serviceable in relieving pain. Anodynes may be given as needed. Absolute rest is essential. If an abscess forms it may be evacuated, and applications of tinct. iodini are useful in promoting resolution.

What is mastitis?

Inflammation of the breast. It is divided into: (1) Glandular; (2) interstitial; and (3) sub-glandular. In the first the lobules of the gland are inflamed. In the second the connective tissue is affected. In the third the connective tissue beneath the gland is involved.

What are the symptoms of mastitis?

1. In interstitial and sub-glandular mastitis, the symptoms are those of abscess in the cellular tissue anywhere; slight constitutional disturbance, except in large sub-glandular abscess, and the pain is *not increased* by suckling the child.
2. In glandular mastitis there is a rigor and high fever, preceded by a hard lump in the breast, and suckling causes severe pain.

What is the treatment of mastitis?

1. When the connective tissue is involved suppuration is almost inevitable, and is to be treated on general surgical principles, poultices, early incision, and antiseptic treatment being usually indicated.
2. In glandular mastitis various measures have been employed; massage or stroking, rubbing, and kneading the breast; endeavoring to empty engorged milk sinuses, and to remedy the blood stasis. An ice-bag is strongly recommended; also, compression by strapping with adhesive plaster, or with a plaster-of-Paris dressing. To directly affect the blood-supply and functional activity of the gland, belladonna is used, internally and externally. The sulphid of calcium internally, and iodid of lead or lead water and laudanum externally are used, and many other remedies have advocates.

In all cases the breast should be suspended in a sling. When incisions are necessary, they should be made in a line radiating from the nipple, to avoid severing milk ducts. The abscess cavity

should be washed out thoroughly with an antiseptic solution, and dressed antiseptically, and quinin should be given, with a good diet, and stimulants if necessary.

What are the chief causes of mastitis?

Cold, obstruction of milk ducts, septicemia, and infected nipples.

What affections of the nipples are met with?

The nipples may be simply tender, or inflamed, with resulting abrasions, excoriations, and fissures. The inflammation may be simple, aphthous, or eczematous.

How are sore nipples to be treated?

1. Stop suckling, and have the milk removed by a pump or massage. Have patient use a nipple shield.
2. Apply astringent remedies, or such as act by excluding the air—the best applications are tannin and glycerin, compound tincture of benzoin, collodion—or wash the nipple with a saturated solution of sodium biborate and water and apply aristol ʒij, in cacao butter ʒj, three or four times a day. All treatment is, however, uncertain if the child is allowed to nurse while the nipple is sore.

What are agalactia and galactorrhea?

1. Agalactia is a suppression or greatly diminished flow of milk. The secretion of milk may be augmented by the free use of fluids, especially milk, and by persisting in applying the child to the breast. Attention to the general health is important.
2. Galactorrhea is an excessive secretion of milk. This may be remedied by the use of coffee and belladonna, and by a diet consisting of very little liquid and more solid food. The name is sometimes used to denote incontinence of milk from want of muscular tone in the nipples. This is to be treated with astringents.

What are the principal congenital defects in the child which require attention?

Hare-lip; imperforate anus or urethra; spina bifida; club-foot; cephalhematoma; patulous foramen ovale, stenosis or atresia of the gall ducts.

What general rules are applicable to these affections?

1. Hare-lip is to be operated on at once, if it interferes with suck-

ling; otherwise we may wait a few months, until the child is stronger.

2. Imperforate anus and urethra are to be operated on at once.
3. The treatment of other malformations should be begun as soon as practicable.

What is a patulous foramen ovale?

A failure of the foramen in the auricular septum to close after birth. Hence the blood is diverted from the lungs. The child is subject to spells of partial asphyxia (rarely continuous) and the face becomes dusky or livid; hence the name a "blue child."

What is to be done?

Treatment by posture; the child is to be kept on its *right* side, that the action of gravitation may hinder the escape of the blood through the foramen.

What is spina bifida?

It is a tumor situated usually in the sacral region, although it may occur in any part of the spine. It contains cerebrospinal fluid, which is covered in the same manner as the rest of the spinal cord. The disease is caused by a non-development of the vertebral arches. It is usually associated with hydrocephalus. Most cases prove fatal.

What is cephalhematoma?

The term is applied to an extravasation of blood either externally, between the cranial periosteum and the bone, or internally, between the dura mater and the interior of the skull. It may appear on any of the cranial bones, but is most common in the parietal region. It never passes a suture.

Symptoms.—When first appearing the tumor is tense and resisting, presenting somewhat the appearance of a caput succedaneum; in a few days, however, the borders become harder than the rest of the swelling, and soon become as hard as bone, which, in fact, they are. A slight internal cephalhematoma is frequently found at the same time. The latter, in some cases where much blood is extravasated, is an extremely dangerous complication.

Cause.—In many cases somewhat obscure, as it frequently appears upon parts of the head not pressed on during labor. The *immediate* cause is small sub-periosteal hemorrhages, due to rupture of the extremely fragile vessels, the great mobility of the peri-

osteum accompanied by a somewhat hyperemic condition of the cranium.

Diagnosis.—Limitation to one bone, never jumping a suture; its gradual increase after birth; caput succedaneum decreasing at the same period. The mobility of the skin. The *prognosis* in external cephalhematoma is good.

Treatment.—A compress containing some evaporating lotion and a bandage is generally all that is necessary. When the tumor is large and persists, it is sometimes well to incise under strict antiseptic precautions, and wash out carefully. Moderate pressure should afterward be made.

ASPHYXIA NEONATORUM

What is asphyxia neonatorum?

It is a condition of suspended animation caused by nonareation of the fetal blood. Its most common cause is pressure on the umbilical cord before or during birth. It may be caused by tetanic contraction of the uterus, marked hemorrhage in the mother may also be a cause.

What are the two principal forms of asphyxia neonatorum?

Asphyxia livida, in which the child is cyanotic; the face and skin generally are of a dusky purple hue, the conjunctivæ are injected, and the eyes protrude. The cord pulsations are generally slow and full.

Asphyxia pallida, in which the child is pale and generally relaxed; the surface is cold and the appearance anemic.

How would you treat a child suffering from asphyxia?

In the livid form cut the cord, allowing a dram or two of blood to escape. In asphyxia pallida it is well to press the blood from the cord toward the umbilicus. The child may be placed in a hot bath, its head supported, and a small quantity of cold water dashed over the chest. In the latter case friction should be made over the body as soon as the infant is removed from the water.

How may a child be resuscitated when apparently still-born?

If it does not at once respond to spanking or dashing water upon its chest, resort to the following methods of resuscitation—

1. Byrd's method *modified*. The physician sits with his lap covered by a rubber apron or oil cloth. The thumb and first finger of the right hand should lightly enclose the neck of the child and the

fingers of the same hand support the back, which, with the head, are lowered considerably below the level of the body, the child thus hanging head down. The left hand clasps the buttocks of the child. The body is then bent forward on itself, thus producing expiration, then freely extended, producing inspiration.

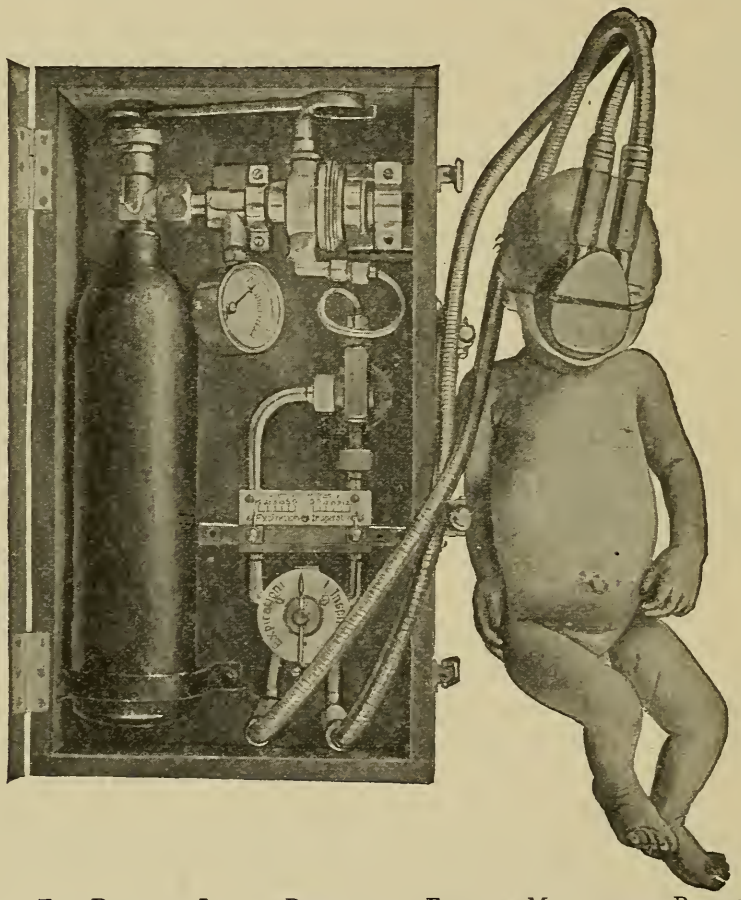

FIG. 80.—THE DRAEGER INFANT PULMOTOR. FOR THE MECHANICAL PRODUCTION OF ARTIFICIAL RESPIRATION IN CASES OF ASPHYXIA NEONATORUM.—(*Edgar.*)

By thus folding and unfolding the body a very successful means of artificial respiration is made. The lowered head determines the child's blood to the brain, thus keeping the important nerve centers supplied with blood.

2. To Sylvester's method of artificial respiration. The child is laid

upon its back with its shoulders slightly elevated. The physician, standing at the head, grasps the arms at the elbows and alternately raises them above the head and depresses them against the chest.

3. To Schultze's method. The obstetrician, standing, takes the child in both hands, with the back of the head pointing toward the operator. The fingers lie across the back at the scapulæ, with the thumbs against the sides and front of the chest. The face now looks upward. The child is now raised until it is above the operator's head; in so doing the lower part of the trunk and extremities, as well as the head, fall backward. By swinging the child in this manner the body is alternately straightened out and doubled, causing a depression and elevation of the diaphragm and favoring inspiration and expiration.
4. Mouth-to-mouth insufflation. Wipe the baby's face, compress the nostrils with the fingers of one hand, and press the other hand upon its epigastrium. Then apply your mouth to the child's and blow into it. The pressure of the second hand prevents the air from entering the intestines. A suitable pulmonary aspiration apparatus accomplishes the same result.
5. Labord's method consists in placing the infant on its back, with a rolled-up towel under the shoulders, as in Sylvester's method. The head should be allowed to hang low. The tongue is rhythmically drawn out and in about as frequently as the child would breathe. This method has been highly recommended.
6. A galvanic battery may be used.

Attempts at resuscitation should be continued as long as there is any hope of success. If, however, no heart-beats or pulsation of any of the arteries can be felt five after or ten minutes, and the body becomes progressively colder, further attempts rarely do much good.

7. The use of a pulmotor, an instrument for the mechanical production of respiration has proven useful.

CONJUNCTIVITIS OF THE NEWBORN

What is conjunctivitis or ophthalmia neonatorum?

This is a disease affecting the eyes of newborn children, and is generally the result of specific infection caused by the eyes of the child coming in contact with the vaginal secretions of the mother, who, in most cases, has had either purulent endometritis or gonorrhea.

Various bacteria may cause it, thus we may have infection by the staphylococcus, pneumococcus or the gonococcus; the latter is the most virulent.

What are the symptoms?

These appear about the second to the fifth day. The eyelids become slightly red and swollen, with a purulent secretion. As the disease progresses this swelling increases, the secretion becoming of a thick yellow or green color, while the conjunctiva is greatly infiltrated, swollen, and roughened. The cornea soon becomes affected. After six to eight weeks the patient may recover, although chronic blennorrhea is by no means rare and loss of sight common.

What is the prognosis of ophthalmia neonatorum?

The *prognosis* depends on the severity of the disease, the nature of the infection, and the time at which the patient comes under treatment. With the careful execution of prescribed treatment, the disease when taken in the earliest stages generally responds quickly. When the cornea is affected, the danger of blindness is great.

Describe the treatment of ophthalmia.

The danger of ophthalmia is much decreased when the mother receives an antiseptic vaginal douche immediately before or during labor. As prophylaxis, the eyes of the child as soon as it is born should be washed with a saturated solution of boracic acid, and gtt. j of a 2 per cent. solution of silver nitrate injected by means of a dropper, the lids being held apart. When the disease is already in progress, the eyes must be carefully washed out with large quantities of saturated boric acid solution, and one to three drops of a solution of silver nitrate, as above, instilled. In severe cases, ice compresses should be continually applied until the inflammation ceases, with strong solutions of boracic acid or bichlorid of mercury, 1 : 10,000 or 12,000, must be used. If only one eye is affected the other eye should be carefully protected not only by frequent douching but by pledgets of cotton or gauze. A 10 per cent. solution of argyrol may be substituted for the silver nitrate solution. The contagiousness of this affection should be impressed on the person taking charge of the case. She should be cautioned to wear rubber gloves and to protect her own eyes. Under no circumstances should a nurse having charge of a case of ophthalmia take charge of a puerperal woman.

THE UMBILICUS

To what diseases may the umbilicus be subject?

The umbilicus is subject to various diseases and accidents after detachment of the cord. Among these are hernia, infection, hemorrhage, and vegetations.

How is umbilical hernia caused?

By the non-closing of the umbilical ring or the lack of tone in the parts. It appears usually in the first few weeks of extra-uterine life, as a small tumor, which increases when the child cries or coughs, and varies somewhat with respiration.

Describe the treatment of umbilical hernia.

The treatment consists in replacing it and covering with a large button covered with some soft material and fastened with strips of adhesive plaster. A more recent treatment consists in drawing the two sides of the umbilical opening together, so as to relieve tension, and holding them thus by strapping with narrow bands of adhesive plaster. If persistent, a truss should be fitted carefully over the umbilicus, or the opening may be closed by surgical procedures.

Describe the cause, symptoms, and treatment of septic infection of the umbilicus.

This appears when proper cleanliness has not been used in the care of the stump of the cord, the seat of its recent attachment, which presents a surface open to the absorption of septic material. Having become infected, the borders of the point of attachment are red and swollen, and the adherent remains of the cord black, or brownish-black, and moist. On inspection some pus will be found in the folds of the ring.

Treatment.—The greatest care must be exercised in these cases; for if neglected the septic process will proceed inward, producing general septic infection and death. The umbilicus should be washed with a saturated solution of borax in water, or hydrogen peroxid and dusted with a powder consisting of salicylic acid and starch 1 : 3. A very good dressing is aristol. A small antiseptic pad and bandage should hold the dressing in place.

What can be said of umbilical hemorrhage?

The simplest form of this may be caused by slipping of the ligature holding the cord stump. Another and more serious, often fatal,

form occurs about the period of detachment of the cord, from the fifth to the eighth day after birth. It is caused generally by a poor condition of the tissues, or hemophilia. It is sometimes ascribed to syphilis and more frequently it occurs from infection, hemophilia, and is one of the symptoms of hemoglobinuria or Winckel's disease. It appears as a continuous oozing from the umbilicus, and persists in spite of all efforts at cure. It is sometimes accompanied by purpuric spots on the skin. Hemorrhages often occur into the stomach and intestines. The blood is frequently found to be deficient in quality, and the corpuscles more or less abnormal. Treatment should be directed to improving the condition of the blood, and the administration of styptics, principally some of the preparations of iron. Hemorrhages from the umbilicus may also occur soon after birth from the slipping of the knot of the ligature. In this case a fresh ligature should be applied, preferably after crushing the cord stump with a pair of hemostatic forceps. In those conditions caused by blood degeneration, such as those mentioned, Winckel's disease, etc., direct transfusion of blood may be tried with benefit. As a rule though the child dies notwithstanding all treatment.

What can be said of vegetations of the umbilicus?

Vegetations of the umbilicus frequently are seen around the insertion of the cord after it has become detached. They should be treated by silver nitrate or acetic acid. Care must be taken not to mistake this condition for hernia, or in cases of polypoid growths for a hernia of Meckel's diverticulum.

Describe mastitis neonatorum.

Inflammation of the breasts occurs sometimes in the newborn. The cases are divided about equally among boys and girls. A fluid resembling colostrum can be squeezed out of the nipple. In rare cases suppuration occurs. The nipples are generally retracted, the breasts appearing hard and inflamed. As treatment, careful washing with a mild antiseptic solution, accompanied by the application of lead water and laudanum. Should the swelling progress to suppuration, it should be opened, washed out with an antiseptic solution, and covered with compress and bandage.

JAUNDICE OF THE NEWBORN

What is icterus neonatorum?

A certain amount of yellowness appears on the skin of many newborn children, and usually disappears about the eighth or ninth day.

In some cases the skin is of a deep yellow hue, the color being general, showing even in the conjunctivæ. Such a condition constitutes a distinct class of diseases, and may be serious. Feeble, prematurely born children, or those who have suffered, for any reason, traction or pressure on the funis during labor, are chiefly predisposed to jaundice. Malformations of the bile ducts, syphilis, and inflammations of the gastro-intestinal tract are also causes. Jaundice may also be a symptom in general septic infections in the newborn.

Treatment.—In simple cases a regulated diet is sufficient. In all cases the jaundice appears chiefly as a symptom, and the cause must be sought and removed if possible.

TETANUS, OR LOCKJAW, IN THE NEWBORN

Describe the causes, symptoms, and treatment of tetanus neonatorum?

This is most apt to be secondary to infection of the umbilical ring, and is distinctly a microbic disease.

The symptoms appear as restlessness and tremor of the lower jaw; soon the mouth becomes closed, and cannot be opened. In a short time spasms make their appearance, the attacks being distinctly tetanic in character. The temperature is high, reaching 107–109° F. The termination is fatal, the cause of death being exhaustion or asphyxia. The treatment consists of nourishment by enema, and potassium bromid or chloral in suitable doses. Antitetanic serum has given good results in many cases.

What is thrush?

This is a disease attacking the mucous membrane of the tongue and mouth, and is characterized by the appearance of patches somewhat resembling curd. It is more common in bottle-fed babies than in those fed from the breast. The disease is caused by a fungus belonging to the general class of molds.

Treatment.—The best local application is boracic acid in a solution of grs. xx to the f℥j of water, and applied to the buccal mucous membrane by means of a camel's-hair brush.

The names of Muguet and Sprue are also given to this disease.

APPENDIX OF CERTAIN OBSTETRIC CONSTANTS

OBSTETRIC CONSTANTS

ANATOMY AND PHYSIOLOGY

The female internal genital organs are the ovaries, oviducts, uterus and vagina.

The female external genital organs are the mons veneris, labia majora and minora, clitoris, vestibule and fossa navicularis, hymen or carunculæ myrtiformes, fourchette and perineum and the breasts.

The bones composing the obstetric pelvis are five in number—last lumbar vertebra, sacrum, coccyx and two ossa innominata.

The uses of the female pelvis are: (1) To support and transmit the weight of the body, (2) to contain and protect certain organs, (3) to serve as a parturient tube or canal through which the child may be guided during labor.

The differences between the female and the male pelves are: In the female the subpubic arch is more rounded, the transverse diameters are relatively greater and the antero-posterior diameter relatively less. The transverse diameter of the inlet crosses the antero-posterior at a point in front of the intersection of the oblique diameters and the ischial spines are to the outer side of plumb lines dropped from the postero-superior iliac spines. The bones of the female pelvis are lighter in structure, the "flare" of the iliac bones is greater and the perpendicular depth not so great in the female pelvis as in the male.

The joints in the pelvis are: three lumbo-sacral, two sacro-iliac, the pubic and the sacro-coccygeal, seven in all.

The cardinal points of the pelvic inlet, sometimes called the cardinal points of Capuron, are the sacro-iliac joints and ilio-pectineal eminences on each side, four in all.

The diameters of the pelvic inlet are the (1) *antero-posterior or sacro-pubic diameter* measured from the promontory of the sacrum to the middle of the posterior surface of the pubic joint, 11 centimeters or

4 1/2 inches. It is called the conjugata vera or true conjugate. *Externally* on the surface of the body this diameter is taken from the depression below the spine of the last lumbar vertebra to the middle of the anterior surface of the pubic joint. It measures 20.5 centimeters or 7.9 inches and is known as the *external* conjugate; subtracting 9 centimeters or 3.4 inches, leaves 11.5 centimeters or 4.5 inches, length of true conjugate.

Vaginally it may be taken by two fingers in the vagina measuring from the promontory of the sacrum to the inferior border of the anterior surface of the pubic point and deducting 2 centimeters.

(2) The *transverse* diameter of the pelvic inlet is taken between the widest points in the pelvic inlet, 12.5 centimeters or 4.8 inches.

To measure it externally two measurements are required:

(*a*) Between the anterior-superior spines of the ilium, 26 centimeters or 10.5 inches.

(*b*) Between the highest points of iliac crests 28 centimeters or 11 inches.

(3) The transverse diameter of the pelvic cavity is measured between the great trochanters, 32 centimeters or 12.5 inches.

(4) The right diagonal of the pelvic inlet is measured from the right sacro-iliac joint to the left ilio-pectineal eminence, 13.5 centimeters or 5.3 inches.

(5) The left diagonal taken from the left sacro-iliac joint to the right ilio-pectineal eminence, 13 centimeters or 5 inches.

Externally the above are measured from the postero-superior spine of one side ot the antero-superior spine of the opposite side. The right external diagonal measures 22.5 centimeters. The left 22 centimeters.

(6) The circumference of the bony pelvis is 40 centimeters or 15.8 inches. The external circumference is 85 to 90 centimeters, 33 1/2 to 35 1/2 inches.

The antero-posterior or conjugate diameter of the pelvic outlet is taken from the tip of the coccyx to the inferior border of the symphysis pubis. It is greatly increased by the recession of the coccyx in labor. Its normal measure is 9.5 centimeters or 3 3/4 inches. When increased by recession of the coccyx it measures 13 centimeters or 5 inches.

The transverse diameter of the outlet is taken from one tuberosity of the ischium to its fellow of the opposite side and measures 4 inches or 11 centimeters. It is taken externally between these points.

The depth of the pelvic cavity is 3.8 centimeters or 1 1/2 inches in

front, 8.9 centimeters or 3 1/2 inches at the sides and 10.8 centimeters or 4 1/2 inches posteriorly. Following the curve of the sacrum it is 13.8 centimeters or 5 1/2 inches in its posterior measurement. The average diameters are about 12 centimeters or 4 3/4 to 5 inches.

The planes of the pelvis are imaginary levels drawn through any part of the birth canal. They are exactly at right angles to the pelvic axis throughout its entire length.

The axis of the pelvis is an imaginary line drawn from the center of the conjugate diameter of the inlet, parallel to the face of the sacrum and coccyx to the center of the conjugate diameter of the outlet.

It is a curved line having a general direction downward, backward, upward and forward and is sometimes known as the curve of Carus.

The muscles contained in the pelvis and which modify its diameters, are the psoas iliacus, pyriformis, obturator internus.

The muscles which form the pelvic floor are the levatores ani, coccygeus and bulbo-cavernosus, transversus perinei or ischio-bulbosus and external sphincter ani.

The nerve supply of the uterus is derived from the plexus uterinus magnus, formed by branches from the superior mesenteric plexus and from the ovarian ganglia. The sympathetic nervous system also furnishes fibers, the vasomotor system has much influence on the womb. Independent ganglia like those found in the heart are imbedded in the uterine muscle.

The arteries supplying the uterus are the uterine and ovarian arteries. The veins accompany the arteries.

The uterus is supported in situ by:

1. The utero-sacral ligaments.
2. Slightly by the broad, round, and vesico-uterine ligaments.
3. The walls of the vagina act as a fleshy column of support.
4. The retentive power of the abdomen due to the existence of a partial vacuum in the abdominal cavity also acts as a support.

EMBRYOLOGY

The internal reproductive organs are developed from—Wolffian bodies, two in number, Müllerian ducts, also two in number.

Changes taking place in the ovum after fecundation:

1. When the ovum is mature two small cells are detached from the main body of cells; these are called the polar globules.
2. The portion of the ovum remaining after the throwing off of the polar globules is called the "female pronucleus."

3. Fecundation is effected by the penetration of the head of one spermatozoön; this is called the "male pronucleus."

4. The male and female pronuclei coalesce. The ovum is now called the "oösperm or blastophere."

5. The segmentation of the nucleus and vitellus into the mulberry mass.

6. A clear fluid is secreted within the ovum, pressing these segments to the surface, where they form a double layer of cells. The outer is called the epiblast, the inner the hypoblast. Later a third layer of cells develops between the epiblast and hypoblast known as the mesoblast. Together they are known as the blastodermic vescile.

7. There then appears upon the outside of the vitellus the area germinativa.

8. In the area germinativa there appears the primitive trace.

9. A covering for this line or embryo now forms, the embryonic line sinks into the center of the ovum, while the edges of the external blastodermic layer about the area close around it, inclosing it in a sac called the amnion.

10. A fluid develops between the amnion and the embryo, called liquor amnii.

From the epiblast is formed:

The epidermis, hair, nails, the epithelium of the mouth, nose and of the cloaca, glands of the skin, brain and spinal cord, organs of special sense.

From the hypoblast is formed:

Epithelium of the walls and glands of intestines, epithelium of lungs and air passages.

The mesoblast furnishes:

The corium, muscles, bones, connective tissue, muscular layers of digestive tract, blood-vessels and the genito-urinary system.

The placenta is developed in the following manner:

The allantois carrying with it the blood-vessels which are to connect the embryo with the periphery of the ovum, fuses with the chorion and carries into each villus of the latter a small loop of blood-vessels. The chorionic villi atrophy over the whole ovum, except that part which is in direct contact with the decidua serotina (placental decidua).

The placenta is a separate organ at about the third month, and during this month its circulation is complete.

The fetal circulation:

The blood is propelled from the left ventricle of the fetus through

the aorta and iliac arteries, to the point where the umbilical arteries are given off; through these to the placenta, and back again through the umbilical vein to the liver, where most of the blood passes through the portal circulation and empties by the hepatic vein in the vena cava; the remainder passing through the ductus venosus empties directly into the vena cava without going through the liver. From this it enters the right auricle, and is deflected by the Eustachian valves into the left auricle through the foramen ovale, and thence into the left ventricle; to the pulmonary artery through the ductus arteriosus into the aorta. It will be noticed that the venous blood of the fetus is more oxygenated than the arterial. After birth the foramen ovale closes, and the peculiarly fetal vessels disappear.

CHANGES IN POSITION WHICH THE UTERUS UNDERGOES DURING PREGNANCY

During the first month the increased weight causes it to descend in the pelvis.

End of second month, still low in pelvis and unusually anteverted.

End of third month, same, but a little larger.

End of fourth month, fundus can be felt just above symphysis.

End of fifth month, fundus midway between symphysis and umbilicus.

End of sixth month, fundus at level of umbilicus.

End of seventh month, 2–3 1/2 finger breadths above umbilicus.

End of eighth month, 1–2 finger breadths below ensiform cartilage.

End of ninth month, touches the ensiform cartilage.

End of tenth month, same as end of eighth.

SIZE OF EMBRYO AT EACH MONTH IN CENTIMETERS

	Size of Embryo
First month,	1 × 1 = 1 cm.
Second month,	2 × 2 = 4 cm.
Third month,	3 × 3 = 9 cm.
Fourth month,	4 × 4 = 16 cm.
Fifth month,	5 × 5 = 25 cm.
Sixth month,	6 × 5 = 30 cm.
Seventh month,	7 × 5 = 35 cm.
Eighth month,	8 × 5 = 40 cm.
Ninth month,	9 × 5 = 45 cm.
280 days or ten months,	10 × 5 = 50 cm.

MENSTRUATION, ETC.

Menstruation.—A periodical function of the female genital organs characterized by a discharge of blood from the uterus.

Menorrhagia.—An abnormally increased menstruation.

Metrorrhagia.—A hemorrhage from the genital organs occurring at other times than the regular menstrual periods.

Dysmenorrhœa.—Painful or difficult menstruation.

Xenomenia.—Vicarious menstruation.

Supplementary Menstruation (see page 41).

ABORTION

The causes of spontaneous abortion are:

Ovular	Syphilis. Placental apoplexy and detachment, from hemorrhage. Placental degeneration, amyloid or fatty. Dropsy of amnion. Violence, accidental rupture of membranes, etc.
Maternal	Obesity. Consanguineous marriages. Rapidly succeeding pregnancies. Hot climates and high altitudes. Syphilis. Poisons either by drugs or disease. This would include all oxytocic drugs. Habit Uterine displacements. Disease of the tubes and ovaries. Trauma. Endometritis. Kidney or liver toxemia.
Paternal	Syphilis; especially syphilitic spermatozoa. Tuberculosis. Extreme youth. Old age.

Symptoms of abortion are pain, hemorrhage and uterine contraction.

General diagnosis of abortion: Patient has the signs of pregnancy, there is pain, more or less hemorrhage and uterine contractions.

Hemorrhage is from the uterus. The os and cervix are dilated and soft. Possibly the ovum can be felt.

Indications for Therapeutic Artificial Abortion.—Eclampsia, obstinate uncontrollable vomiting of pregnancy, bad and persistent cases of albuminuria, advanced cases of uterine tumors, placenta prævia, highly contracted pelvis, and other conditions in which the mother's life is threatened by the continuance of pregnancy.

Indications for Treatment

1. Rest in bed, suppository 1 gr. opium.
2. If hemorrhage continues, tampon.

DIFFERENTIAL DIAGNOSIS BETWEEN THREATENED, INEVITABLE INCOMPLETE AND COMPLETE ABORTION

THREATENED ABORTION.	INEVITABLE ABORTION.	INCOMPLETE ABORTION.	COMPLETE ABORTION.
Hemorrhage, usually slight and free from clots.	Hemorrhage, profuse and continuous, clotted and dark colored.	Hemorrhage, persistent, at times profuse, at times scanty; dark colored and offensive.	Entire cessation of hemorrhage.
Pain not marked.	Pain cramp-like and severe.	Occasional attacks of pain may be present.	Entire cessation of pain.
Os slightly patulous.	Cervical canal dilated.	Cervical canal dilated enough to admit finger, which feels parts of decidua, membranes, or blood clots.	Os retracted.
Uterus soft and enlarged, showing angle of anteflexion between upper and lower segments.	Uterus soft and enlarged; angle between upper and lower uterine segments effaced.	Uterus soft, large, and boggy; not involuting.	Uterus large but retracted and firm. Involution proceeding naturally.
Dishcarge is bright colored blood.	Discharge is dark blood, clots, and portions of ovum.	Examination of discharged material shows only fragmentary parts of ovum.	Discharge is ordinary lochia, which gradually ceases.
All signs of pregnancy present except amenorrhea.	All signs of pregnancy present except amenorrhea.	Signs of pregnancy arrested.	Subsidence of signs of pregnancy and possible establishment of milk secretion.

3. Dilate cervix with gauze or mechanical dilators.
4. Remove ovum.
5. Wash out uterus with creolin or lysol 1 per cent. or normal salt olution and pack with gauze.
6. Stimulation, if necessary.

The *dangers* of abortion are:

1. Hemorrhage—often great.
2. Retention of the placenta, either in whole or in part.
3. The womb is apt to remain enlarged and uterine disease may result.
4. Sepsis. Pelvic and peritoneal inflammations are more common after abortion.

PLACENTA PRÆVIA

The varieties of placenta prævia are:

Marginal, when its edge is on the border of the internal os.

Lateral, when its edge is alongside the internal os.

Partial, when its edge is partially over the internal os.

Central, when the placenta is entirely over the internal os.

Treatment.—In all forms but central, watch patient and if hemorrhage is bad dilate os, rupture membranes and by forceps bring down head so as to squeeze the placenta, then deliver. Remove placenta and pack uterus. In central form push placenta to one side or tear through it. Do quick podalic version and deliver. Remove placenta and pack uterus to prevent hemorrhage. Stimulate patient as usual in hemorrhage. Some authorities recommend vaginal or abdominal Cæsarean section.

ECTOPIC PREGNANCY

Ectopic pregnancy is pregnancy in which the ovum is developed outside the cavity of the uterus. The most common form is tubal. For symptoms see page 74; diagnosis, see page 75; prognosis, see page 77.

Treatment.—Abdominal section as soon as diagnosis is made. After rupture, section in almost every case. The only exception being that if rupture has occurred and a secondary abdominal pregnancy developed (which is extremely rare), the child being immature, operation may be delayed until child is viable, then section is to be done to save child. When placenta is firmly attached and cannot be removed without great danger of hemorrhage, it should be tied off, the wound packed, and the placenta allowed to slough away.

SYMPTOMS OF PREGNANCY COMPLICATED WITH ANTE-DISPLACEMENT

1. Nausea and vomiting are common.
2. Frequent micturition with pain.
3. Irritability of the bowels.
4. Miscarriage.

Treatment:

1. Elevate uterus by means of a pessary or large tampon.
2. Operative procedures.
3. Possibly empty uterus in extreme cases.

SYMPTOMS OF PREGNANCY COMPLICATED WITH RETRO-DISPLACEMENT

1. Pain in back and down thighs.
2. Frequent and painful micturition, and if cervix presses long on bladder actual cystitis may develop.
3. Irritability of rectum, constipation and sometimes ribbon-like stools.
4. Headache and nausea may occur.
5. Abortion, peritonitis or incarceration may occur.

Treatment:

1. Knee-chest position.
2. Draw cervix downward with a volsella and with two fingers of the other hand replace fundus and hold in place by a pessary if no adhesions exist.
3. If uterus is adherent try to stretch adhesions with fingers in posterior cul-de-sac and replace.
4. If this cannot be done, tampons of cotton or lamb's wool saturated with 30 per cent. ichthyol in glycerin may be used.
5. Open abdomen or posterior cul-de-sac, break up adhesions and replace.
6. Empty uterus.
7. In extreme cases hysterectomy may be necessary.

Malignant deciduoma or corio-epithelioma is a malignant degeneration of retained decidual débris characterized by a tendency to the formation of metastatic deposits throughout the body. It is usually fatal. Is also known as malignant syncytioma. The treatment is hysterectomy.

TOXEMIA OF PREGNANCY

The toxemia of pregnancy is an auto-intoxication produced by poisons generated in the system and not eliminated, principally through faulty action of the liver, skin, lungs, kidneys and intestines. It may or may not be associated with disease of the kidneys.

Symptoms:

1. Constant dull frontal headache with flashes of light and sparks flying before eyes.
2. Substernal distress.
3. Pulse of high tension.
4. In some cases a very slight elevation of temperature.
5. Dry skin and coated tongue.
6. Nervousness or some mental change.
7. Specific gravity of urine decreases. Decrease in urea and solids generally, casts and albumin often present.
8. If the condition is not relieved eclamptic convulsions usually develop.

Treatment:

1. Increase elimination by hot baths or hot packs. Diet of milk, bread and fruits.
2. Some cases hypodermoclysis or saline transfusion.
3. Veratrum viride, ♏ xv, by hypodermic.
4. Fresh air.
5. A reasonable quantity of water.
6. Give brisk purgative with calomel gr. v with salines.
7. Enteroclysis, repeated several times and until bowels are thoroughly unloaded.
8. For nervous condition bromides or small doses of chloral hydrate. If patient is anemic Basham's mixture.
9. Free diuresis and diaphoresis.
10. In some cases it may be necessary to empty uterus. Vaginal or abdominal Cæsarean section is often practised if the patient is in an eclamptic convulsion.

Polyhydramnios or hydramnios (see pages 92 and 93).

SIGNS OF PREGNANCY, DIAGNOSIS OF PREGNANCY (P. 93, ETC.)

Pregnancy is that condition in which a woman contains within her body a living or growing fetus.

Signs:

1. Presumptive and certain.
2. Objective and subjective.

The most valuable *subjective* signs are:

1. Cessation or change in the menstrual function.
2. Nausea and vomiting.
3. Enlargement of breasts.
4. Frequent micturition or desire to go to stool.

There are many other subjective symptoms of less value.

The *objective* symptoms of *early* pregnancy, *i.e.*, before the fetal heart sounds can be heard, are the following:

1. Unilateral enlargement of uterus.
2. Increase in size of uterus with change in shape of the body, it becoming more globular.
3. Softening and relative broadening of the cervix.
4. Formation of the lower uterine segment (Hegar's sign).
5. Bluish discoloration of the cervix, vagina and lesser labia with increased secretion.
6. Pigmentation of the labia majora, central abdominal line and mammary areola and other parts of body.
7. Increase in size of thyroid gland.
8. Ballottement.
9. Intermittent contraction of uterus (Braxton Hicks' sign).

The certain signs (to be found after the twenty-sixth week) are:

1. Symmetrical enlargement of uterus.
2. Fetal heart sounds.
3. Recognition of fetal movement by palpation.
4. Recognition of fetal parts by palpation.
5. Placenta, or in some cases, the funic souffle.

DIFFERENTIAL DIAGNOSIS BETWEEN PREGNANCY AND OTHER TUMORS

Differential Diagnosis of Abdominal Tumors

Small cysts of the ovary may be confounded with:

1. Pregnancy.
2. Extra-uterine pregnancy.
3. Distended Fallopian tube.
4. Inflammatory exudation into the broad ligament.
5. Peritonitic exudation.
6. Tuberculous peritonitis.

Large cysts occupying the greater part of the abdominal cavity may be mistaken for:

1. Ascites.
2. Pregnancy.
3. Fibroid tumors of the uterus.
4. Fibrocysts of the uterus.
5. Fat in the abdominal wall.
6. Hematometra.
7. Phantom tumors.

Extra-uterine (Tubal) Pregnancy	Small Ovarian Cyst
1. Rapid and regular growth.	1. Slower growth.
2. Amenorrhea, followed by menorrhagia, with discharge of pieces of decidua.	2. Menstruation not altered except occasionally in broad-ligament cysts.
3. General symptoms of pregnancy present, changes in color of vagina, etc.	3. Symptoms of pregnancy absent.
4. Enlargement of the uterus.	4. No enlargement of the uterus.
5. Attacks of pain increasing in severity, finally culminating in a very severe attack, followed by shock and symptoms of internal hemorrhage.	5. In small cysts, no attacks of pain except from pressure.

Distended Fallopian Tube	Small Ovarian Cyst
1. The tumor is more elongated.	1. Tumor is round.
2. Is intimately connected with the uterus, which is more or less fixed.	2. Is not connected with the uterus except by the tube, which is not increased in size.
3. Tumor is sensitive to pressure.	3. Tumor non-sensitive.
4. History of acute inflammation and considerable pain.	4. No history of acute inflammation and little, if any, pain.

Inflammatory Exudation into the Broad Ligament	Small Ovarian Cyst
1. History of inflammation following miscarriage, parturition, or operation.	1. No such history.

Peritonitic Exudate	Small Ovarian Cyst
1. The tumor is sensitive to pressure, is fixed, and is generally found in Douglas's cul-de-sac.	1. The tumor is not sensitive, is somewhat mobile, and in small cysts is lateral.
2. The uterus is fixed and feels as if set in some hard substance.	2. The uterus is freely movable.
3. History of acute inflammation.	3. No history of acute inflammation.

Ascites	Large Ovarian Cyst
1. Swelling bilateral and more diffuse.	1. Swelling is central or unilateral and is circumscribed.
2. Percussion gives a tympanitic note *in front and above the tumor*, with *dullness* over the flanks.	2. Percussion gives dullness over the tumor, and a clear or tympanic note at the flanks and above. (Coronal resonance.)
3. Percusion note varies by placing patient in different positions.	3. Little or no variation when position of patient is changed.
4. Abdomen flattens when patient lies down on her back.	4. Abdomen always prominent.

Note.—Ovarian cysts communicating with the intestine, or which have undergone suppuration, sometimes contain gas, and may give a tympanic note on percussion. When the cyst-wall is very tense, a tympanitic note may be transmitted to the surrounding intestines. When such a condition is suspected, more information can be obtained by percussing lightly.

Pregnancy	Large Ovarian Cyst
1. The tumor is more symmetric and is central.	1. Tumor is rather more lateral.
2. Subjective signs of pregnancy present.	2. Subjective signs of pregnancy absent.
3. The enlarged uterus can easily be outlined and composes the tumor.	3. The uterus is small, and the tumor is separate from it.
4. Amenorrhea is present.	4. Menstruation is unchanged or may be increased.

5. Patient's general health good.
6. Hearing the fetal heart and outlining the fetal parts will settle the diagnosis.

5. General health of patient bad.
6. Fetal heart-sounds are absent, and no fetal parts can be outlined.

Uterine Fibroid	Large Ovarian Cyst
1. Tumor is hard, resisting, non-fluctuating, and of slower growth.	1. Tumor is fluctuating, softer, and of more rapid growth than fibroid tumors.
2. Tumor is growing from the uterus, and therefore moves with it.	2. Tumor not connected directly with the uterus.
3. Some enlargement of the uterus.	3. Uterus not enlarged.
4. Menorrhagia generally present.	4. Menorrhagia not generally present.
5. Uterine canal increased in length.	5. No increased length of the uterine canal.

The differentiation between fibrocystic tumors of the uterus and ovarian cysts is very difficult and in many cases impossible. The discovery of other fibrous tumors of the uterus will aid in the diagnosis.

Fat in the Abdominal Wall	Large Ovarian Cyst
1. Usually occurs after the menopause.	1. Occurs during the period of sexual activity.
2. Fat may be grasped between the two hands.	2. Cannot be grasped in the same manner, but shows the outline of a circumscribed tumor.
3. Deposits of fat in other parts of the body.	3. Patient is increasingly emaciated.
4. Does not fluctuate.	4. Fluctuation may be obtained.
5. General health of patient good.	5. General health bad.

Phantom Tumor—Spurious Pregnancy	Large Ovarian Cyst
1. General resonance over the abdomen.	1. Dullness over tumor and presence of coronal resonance only.

2. By distracting the patient's attention the abdomen may be depressed flat.
3. The tumor disappears under anesthesia.

2. Tumor does not disappear, and the abdomen cannot be pressed flat.
3. Tumor does not disappear under anesthesia.

Hematometra	Ovarian Cyst
1. Regular attacks of pain, increased during the time when menstruation ought to appear.	1. No pain except from pressure
2. Menstruation very scant or absent.	2. Menstruation present.
3. Tumor central and formed by the distended uterus.	3. Bulk of tumor lateral and separate from the uterus.
4. Tumor decreases in size, somewhat, between the menstrual epochs.	4. Tumor grows continually.
5. Atresia of the vagina or cervix present.	5. Absent.

The fetal heart sounds average 120 to 160 a minute.

For the more accurate location of the fetal heart sounds the mother's abdomen is divided by two imaginary lines—one from ensiform cartilage to middle of pubic joint, the other a transverse line drawn across the abdomen on a level with the umbilicus. These lines divide the uterus into four quadrants.

Position is the relation which the presenting part of the fetus bears to the four cardinal points on the pelvic inlet.

Presentation is that part of the fetus which presents or comes first at the pelvic inlet.

Brow, parietal, and other abnormal presentations can rarely be diagnosticated except by vaginal examination.

Differential Diagnosis

Tumors Produced by Stenosis or Atresia. (The most common being Hematometra.)	Fibrous Tumors.	Malignant Growths.	Ovarian Cysts.	Pregnancy.
1. Menstruation decreased or suppressed.	1. Menstruation increased.	1. Menstruation increased; characteristic watery discharge.	1. Menstruation slightly increased or not affected.	1. Menstruation suppressed.
2. Rapid growth, increasing regularly at menstrual periods, with slight decrease between them.	2. Slow growth, may increase slightly just before menstruation.	2. Slow growth, not affected by menstruation.	2. Slow growth, not affected by menstruation.	2. Rapid and regular growth.
3. Pain increased during menstruation.	3. Pain slight.	3. Pain severe and constant.	3. Pain more or less constant.	3. No pain.
4. Tumor intrauterine and dull on percussion, except in cases of physiometra, when it is tympanitic.	4. Tumor attached to uterus, but outside of its cavity, hard, irregular and resistant.	4. Tumor apt to be in cervix, and can be felt by vaginal examination; microscope will demonstrate the structure.	4. Tumor extrauterine, and can be outlined by percussion.	4. Tumor intrauterine; fetal parts can be outlined.
5. General health not much affected.	5. Some deterioration in health.	5. Great deterioration in health.	5. Great deterioration in health.	5. Health not affected.
6. Sound cannot be passed into uterus.	6. Sound can be passed into uterine cavity.	6. Sound can be passed into uterine cavity.	6. Uterine cavity empty.	6. Uterine cavity full sound cannot enter unless force is used.
7. Objective and subjective signs of pregnancy basent.	7. Same.	7. Same.	7. Same.	7. Objective and subjective signs of pregnancy present.

Table Showing Methods of Diagnosis in Various Presentations and Positions

Presentation.	Position.	Auscultation.	Palpation.	Digital Examination.
Vertex.	1st position L. O. A. Occiput in relation with mother's left ilio-pectineal eminence.	Heart sounds of child in left lower quadrant of mother's abdomen.	Long axis of child corresponds with long axis of mother. Broad surface of child's back is felt on left side of mother's abdomen. Globe of head at pelvic inlet with constricted portion representing neck just above it. Curved line of back extending on left side. Breech above.	If patient is in labor, vertex can be felt by vaginal examination. Sagittal suture in right diagonal of mother's pelvis. Posterior fontanelle *may* be felt.
Vertex.	2d position R. O. A.	Heart sounds in right lower quadrant.	Same as above substituting right for left.	Same as above substituting left oblique for right.
Vertex.	Posterior rotation of 1st position. Left occiput position L. O. P. Occiput is in relation with mother's left sacro-iliac joint.	Heart sounds heard in left lower quadrant far to left side or if occiput is too far over to the left then the heart sounds are heard at a point of secondary maximum of intensity, which is slightly to right of median line.	Fetal outline is not so well defined. Outline of head at pelvic inlet can be distinguished. Outline of fetal body is narrower. Breech may be palpated at fundus. The fetal outline is on the mother's left side.	Sagittal suture is in left diagonal of mother's pelvis. Anterior fontanelle may be plainly felt about opposite right ilio-pectineal eminence.
Vertex.	Posterior rotation of 2d position R. O. P. This is more frequent than L. O. P. Occiput is in relation with mother's right sacro-iliac joint.	Same as above substituting right for left and left for right.	Fetal outline is to mother's right side, other points same as above.	Sagittal suture is in right diagonal. Anterior fontanelle can be plainly felt opposite ilio-pectineal eminence on left side.

TABLE SHOWING METHODS OF DIAGNOSIS IN VARIOUS PRESENTATIONS AND POSITIONS.—*Continued*

PRESENTATION.	POSITION.	AUSCULTATION.	PALPATION.	DIGITAL EXAMINATION.
Face.	1st position Left Mento-anterior. Chin is in relation with mother's left ilio-pectineal eminence, forehead at right sacro-iliac joint. Fronto-mental diameter is in relation with right diagonal of mother's pelvis. This position is called also right fronto-posterior.	Heart sounds heard moderately well to left of perpendicular line in the left lower quadrant but higher up than in L. O. A.	Long axis of child corresponds with long axis of mother. As the back of the child is posterior, palpation is more obscure. It is possible to palapte the breech near the fundus, and the small prominences of the feet and legs may be felt. Occasionally the side of the child may be palpated on the right side of the uterus.	Reveals the face. The nose, eyes and mouth may be felt if there is sufficient dilatation of the os. The chin may be felt to the mother's left side anteriorly. Chin must always rotate anteriorly under public arch or child cannot be born.
Face	2d position Right Mento-anterior. Left Fronto-posterior. Chin in relation with right ilio-pectineal eminence. Forehead at left sacro-iliac joint.	Heart sounds heard best to the right of median line of abdomen, higher up than in L. O. A.	Same as in first position substituting left for right.	Chin is at mother's right ilio-pectineal eminence. Fronto-mental diameter in relation with mother's left diagonal.
Face.	Left Mento-posterior or Right Fronto-anterior, by some authors called second position of face. Chin is at left sacro-iliac joint, forehead at right ilio-pectineal eminence.	Heart sounds in right lower quadrant but higher up than in R. O. A.	Back of child is to mother's right side and can be plainly outlined. Palpation of head shows it to be higher in pelvis, the neck depression is more plainly marked than in R. O. A.	The forehead is in relation with the mother's right ilio-pectineal eminence. Chin in relation with the left sacro-iliac joint. Fronto-mental diameter in relation with mother's left diagonal. Chin must rotate anteriorly if head is born.

TABLE SHOWING METHODS OF DIAGNOSIS IN VARIOUS PRESENTATIONS AND POSITIONS.—*Continued*

PRESENTATION.	POSITION.	AUSCULTATION.	PALPATION.	DIGITAL EXAMINATION.
Face.	Right mento-posterior or left fronto-anterior, by some called first position of face. Chin is at the right sacro-iliac joint, forehead at left ilio-pectineal eminence.	Heart sounds in left lower quadrant but higher than in L. O. A.	Back of child to mother's left side. Other points same as above, substituting right for left and left for right.	Forehead in relation with mother's left ilio-pectineal eminence. Chin a right sacro-iliac joint. Other points same as above.
Breech.	1st position, Left sacro-anterior (L. S. A.). Sacrum of child is in relation with mother's left ilio-pectineal eminence. Bistrochanteric diameter of child is in mother's left oblique.	Heart sounds are heard best in the left upper quadrant near the perpendicular line.	The abdomen is more prominent in its upper part. The hard resistant breech can be palpated at the pelvic brim. The broad curved outlines of the back can be plainly made out on the left side of the mother's abdomen. The head can be outlined at the upper part of the uterine tumor. Long axis of child coincides with long axis of mother.	Buttocks can be felt at inlet. The anus and genitals may be felt.
Breech.	2d position, Right sacro-anterior. Sacrum of child is in relation with the right ilio-pectineal eminence. Bistrochanteric diameter is in relation with mother's right oblique.	Heart sounds are heard best in right upper quadrant neart he perpendicular line.	Same as above, substituting right for left.	Same.

TABLE SHOWING METHODS OF DIAGNOSIS IN VARIOUS PRESENTATIONS AND POSITIONS.—*Continued*

PRESENTATION.	POSITION.	AUSCULTATION.	PALPATION.	DIGITAL EXAMINATION.
Breech.	Left sacro-posterior L. S. P. Sacrum of child is in relation with mother's left sacro-iliac joint. Child's bistrochanteric diameter is in relation with mother's right diagonal.	Heart sounds are best heard in *right* upper quadrant.	The back of the child cannot be palpated. The feet and legs can be made out in the lower part of the abdominal tumor while the head above may be plainly outlined. Long axis of child corresponds with that of mother.	The longest diameter of the fetal breech is on the mother's right diagonal.
Breech.	Right sacro-posterior R. S. P. Sacrum of child is in relation with mother's right sacro-iliac joint. Bistrochanteric diameter of child in mother's left diagnal	Heart sounds best heard in left upper quadrant.	Same as above except on other side of abdomen.	Longest diameter of breech is left diagonal of mother's pelvis.
Shoulder.	1st position, left dorso-anterior. Right shoulder in relation with mother's left ilio-pectineal eminence. Right arm presents.	Maximum of intensity of fetal heart sounds is heard on the transverse line at its junction and the perpendicular line.	Long axis of child is across the mother's pelvis. The globe of the head can be felt in the mother's left iliac fossa, the breech above on the right side. The broad surface of the back is anterior to and extends obliquely across the mother's pelvis from the right upper quadrant toward the left iliac fossa.	The hand and arm can be felt. "Shake hands" with fetus to distinguish hand, which will be the right. Outline of ribs may occasionally be felt on left side of pelvis.

TABLE SHOWING METHODS OF DIAGNOSIS IN VARIOUS PRESENTATIONS AND POSITIONS.—*Continued*

PRESENTATION.	POSITION.	AUSCULTATION.	PALPATION.	DIGITAL EXAMINATION.
Shoulder.	2d position, right dorso-anterior. Left shoulder in relation with mother's right ilio-pectineal eminence. Left arm presents.	Same	Long axis of child extends obliquely across mother's pelvis. Globe of head can be felt in mother's right iliac fossa, the breech being above on the opposite side of abdomen. Broad surface of body extends obliquely across the mother's pelvis from left upper quadrant to right iliac fossa.	Same, the hand presenting will be the left.
Shoulder.	Left dorso-posterior. Left shoulder of child is in relation with mother's left sacro-iliac joint. *Left* arm presents.	Location of heart sounds is about the same as in first position, but fainter.	Same as in first position but fetal outline is less distinct.	Left hand and arm will be found on examination. Sometines lateral portion of child may be felt in left posterior segment of pelvic inlet.
Shoulder.	Right dorso-posterior. Right shoulder of child is in relation with mother's right sacro-iliac joint. Right arm presents.	Location of heart sounds same as above.	Same as in second position but less distinct.	Right hand and arm present. Lateral portion of child may be felt in right posterior segment of pelvis.

DIAMETERS OF FETAL HEAD (P. 121)

Occipito-mental,	13.5 cm., 5.25 in.
Occipito-frontal,	11.5 cm., 4.5 in.
Suboccipito-bregmatic,	9.5 cm., 3.75 in.
Fronto-mental,	8.5 cm., 3.25 in.
Cervico-bregmatic,	9.5 cm., 3.75 in.
Cervico-frontal,	10 cm., 4 in.
Biparietal,	9.5 cm., 3.75 in.
Bitemporal,	8.5 cm., 3.25 in.
Bimastoid,	7.5 cm., 3 in.
Large circumference from chin to vertex,	37.5 cm., 14.75 in.
Small circumference at suboccipito-bregmatic circumference,	33 cm., 13 in.

SYNOPSIS OF THE MECHANISM OF LABOR IN THE VARIOUS POSITIONS AND PRESENTATIONS

LEFT OCCIPITO-ANTERIOR

First Position of Vertex

1. *Engagement.*—Occipito-frontal diameter in relation with right oblique of mother's pelvis. Occiput in relation with mother's left ilio-pectineal eminence.

2. Descent.

3. Flexion. Suboccipito-bregmatic diameter in relation with right oblique when flexion is complete.

4. Rotation of occiput under pubic arch from left to right.

5. Birth of head by extension.

6. Restitution. Head rotates to left side after birth.

7. Right shoulder swings anteriorly, shoulder rotating from right to left. Left shoulder posterior sweeps over pelvic floor.

8. Birth of shoulders by lateral flexion followed by birth of body.

RIGHT OCCIPITO-ANTERIOR

Second Position of Vertex

1. *Engagement.*—Occipito-frontal diameter in relation with mother's left diagonal. Occiput in relation with mother's right ilio-pectineal eminence.

Same mechanism as in first position except that head rotates from right to left and shoulders from left to right. Left shoulder is anterior. Right shoulder posterior.

OCCIPITO-POSTERIOR ROTATION, RIGHT AND LEFT

In 98 per cent. of these the occiput will rotate anteriorly if time enough is given. If head rotates posteriorly and is small in relation to pelvis it *may* be born in extension over perineum, usually tearing through the latter.

The treatment of posterior rotation of the occiput should be divided as follows:

1. Cases in which the occiput tends to rotate posteriorly, but finally ends in anterior rotation: (*a*) Stimulate patient, (*b*) place her on the side toward which the occiput of child points.

(*c*) Try to rotate by the hand.

(*d*) Try to rotate the occiput anteriorly by forceps.

(*e*) Podalic version may be done.

If the occiput rotates posteriorly, deliver by axis traction forceps. The head is delivered in flexion.

If the head becomes impacted craniotomy must be done.

FACE PRESENTATION

LEFT MENTO-ANTERIOR

First Position

Fronto-mental diameter in relation with right diagonal. Chin in relation with mother's left ilio-pectineal eminence.

1. Descent.
2. Complete extension.
3. Rotation of chin from left to right under pubic arch.
4. Birth of head in flexion.
5. External rotation of head and internal rotation of body (restitution).
6. Delivery of body by lateral flexion. Left shoulder engages first under pubic arch.

RIGHT MENTO-ANTERIOR

Second Position of Face

Fronto-mental diameter is in relation with mother's left diagonal. Chin is in relation with mother's right ilio-pectineal eminence.

Mechanism same as above except chin rotates from right to left. Right shoulder engages first under pubic arch.

LEFT MENTO-POSTERIOR, CALLED SOMETIMES RIGHT FRONTO-ANTERIOR

Forehead in relation with mother's right ilio-pectineal eminence, chin at left sacro-iliac joint.

1. Head enters in complete extension.
2. Descent.
3. Rotation of chin anterior under pubic joint from left to right. If chin does not rotate anteriorly labor ceases and head becomes impacted.
4. Birth of head in flexion.
5. Restitution. As head is born left shoulder swings from left to right into inlet.
6. Left shoulder engages first under pubic arch.
7. Birth of body by lateral flexion.

RIGHT MENTO-POSTERIOR OR LEFT FRONTO-ANTERIOR

Same as above except that after head is born, right shoulder swings from right to left under pubic arch. Right shoulder engages first.

The treatment of face presentations is as follows:

1. If pelvis and head are of relative size and chin is rotating anteriorly. Preserve membranes, support patient and let alone.
2. If chin rotates anteriorly and labor is prolonged, deliver by axis traction forceps in flexion.
3. If chin does not rotate anteriorly try to push up chin and convert into a vertex presentation.
4. Try to extend chin and aid anterior rotation.
5. Podalic version may be done.
6. Bring down occiput sufficiently to do craniotomy.

BREECH, FIRST POSITION

Left Sacro-anterior.—Sacrum is in relation with left ilio-pectineal eminence.

1. Compression or molding.
2. Descent.
3. Rotation of left hip under pubic joint.
4. Internal rotation of body, and head rotates from left to right until occiput is under pubic arch.
5. Delivery of head in flexion.

BREECH, SECOND POSITION

Right Sacro-anterior.—Sacrum in relation with right ilio-pectineal eminence.

Mechanism same as above, substituting right for left and left for right.

Left Posterior Rotation of Sacrum.—Sacrum is at left sacro-iliac joint.

Right Posterior Rotation.—Sacrum is at right sacro-iliac joint.

Mechanism same as in first position except management of head

Management of breech presentation:

1. Preserve membranes.
2. Support patient's strength.
3. As soon as body is born, cover with a warm towel, to prevent respiration. Draw cord down so it will not be pinched.
4. Bring down arms.
5. After hips are born raise them slightly toward the opposite groin of the mother so as to bring the posterior shoulder into the inlet.
6. When occiput rotates anteriorly deliver child by raising body, back of child toward mother's abdomen. Head born in flexion. Any of the methods for delivery of after-coming head may be used.
7. When occiput rotates posteriorly the mother may be laid on the side and the child's body being born to the waist may be first carried slightly backward to engage the shoulders, after this press down over the pubic joint while the body is carried forward, abdomen of child toward the abdomen of the mother. In many cases the occiput may be rotated anteriorly if care is used.

Transverse positions and presentations practically have no mechanism and must be treated by version or embryotomy. Sometimes these may be delivered by vaginal or abdominal section if the child is strong, the mother uninfected and, in the case of vaginal section, the child and pelvis are of relative size. Hospital facilities should be at hand.

Abnormal presentations, such as brow and parietal presentations, occur mostly in contracted pelves and must be treated by converting into vertex or face, otherwise craniotomy must be done. See treatment of these conditions.

DYSTOCIA

Causes.—Excessive sense of pain, weak uterine contractions, rigidity of the os, edema, atresia or displacement of uterus, atresia of vagina, rigid perineum, tumors, hernia and deformities of the pelvis.

Treatment.—See page 144.

ABNORMAL PELVES

(1) Generally enlarged pelves, justo major, (2) generally contracted pelves, justo minor. (3) Flat pelves, (*a*) simple flat, (*b*) rhachitic flat. (4) Transversely contracted pelves. (5) Obliquely contracted pelves by luxation. Obliquely contracted pelves by hip-joint disease. Obliquely contracted pelves by kypho-scoliosis.

Funnel-shaped Pelvis.—Kyphotic pelvis, antero-posterior diameter changed. Lordotic pelvis.

Compressed Pelvis.—Changed from rhachitis or osteomalacia. Spondylolisthitic pelvis, inlet narrowed by slipping forward of the last lumbar vertebra on the sacrum. Pelvis narrowed by exostoses etc.

Most common form of contracted pelvis is the justo-minor pelvis.

Most common form of flat pelvis is the simple flat pelvis.

Most common form of deformed pelvis is the rhachitic flat pelvis.

Treatment of Labor in Contracted Pelves.

1. In justo-minor pelves whose internal conjugate is over 3 1/2 inches, 9 centimeters, induce labor. Especially indicated in multigravida who have lost previous children in labor on account of contracted pelves.

2. Symphysiotomy is indicated when conjugate is 3 1/4 inches, 8.5 centimeters. This operation is not as much used as formerly.

3. Abdominal Cæsarean section is indicated in cases where conjugate is under 3 inches, 8 centimeters.

4. In cases of slight general contraction the child may be delivered by forceps. Version as a rule is not indicated. Positional methods such as Walcher's position may be used.

Treatment of Labor in Flat Pelves.

1. Forceps for slight degree of contraction.
2. Podalic version.
3. Positional methods such as Walcher's, etc.
4. Symphysiotomy or Cæsarean section.
5. Craniotomy.

Treatment of Labor in Obliquely Contracted Pelves.

1. Try to bring down head in long oblique diameter.
2. Podalic version.
3. Operative procedures or craniotomy.

Highly deformed pelves require delivery by abdominal Cæsarean section.

Diagnosis of Eclampsia

Eclampsia.	Epilepsy.	Hysteria.	Apoplexy.	Meningitis.
The patient is pregnant or parturient. Prodromal symptoms of toxemia.	History of repeated attacks before pregnancy began.	The patient is usually neurotic.	Not frequent in pregnancy.	Rare in pregnancy.
Pupils dilated.	Pupils dilated.	Pupils may be dilated.	No prodromes.	History different.
Urine contains albumin, casts, low specific gravity, low urea excretion.	Urine contains no albumin or casts and excretion of solids is nearer normal.	Urine is freely excreted, is pale and clear, and contains no casts or albumin.	Pupils irregular.	Pupils irregular or reflex is slow to act.
There is usually edema.	No edema.	No edema unless there is intercurrent nephritis.	Urine may show characteristics of previous heart or kidney disease.	Nothing characteristic in the urine.
No aura or cry.	Has the characteristic cry and aura.	Patient may have attacks of crying or laughing.	May be present.	No edema present.
Patient is profoundly unconscious.	Patient is profoundly unconscious.	No aura.	Unconsciousness comes quickly.	Patient may or may not be unconscious.
Tonic followed by clonic convulsions.	Tonic followed by clonic convulsions.	Patient is not unconscious. This may be demonstrated in several ways.	No aura.	No aura.
High tension of pulse.	Pulse of high tension during attack.	Convulsions are irregular and are usually worse when friends are present.	Coma but no convulsions.	Convulsions are local. There is usually contraction of the muscles of the neck, frequently high or irregular temperature.

For treatment of Eclampsia see pages 170 and 171.

DIFFERENTIAL DIAGNOSIS BETWEEN TWIN PREGNANCY AND POLYHYDRAMNIOS

Twin Pregnancy.

1. Abdominal tumor is broader, more distended at sides with a sulcus in the median line.
2. Palpation may demonstrate the presence of two fetal bodies.
3. By auscultation two fetal heart sounds will be heard.
4. Fetal movements may be made out at two separate points.

Polyhydramnios.

1. The tumor is rounder.
2. By palpation the fetal body can be outlined with difficulty, the largest part of the tumor being fluid.
3. Only one fetal heart sound can be made out and that with difficulty. The heart sounds are muffled.
4. Fetal movements can be detected at only one point.

Post-partum hemorrhage (see page 163).

Rupture of the uterus (see page 166).

FORCEPS

Indications for Use.—Whenever the life of mother or child or both are in danger from the continuance of labor, providing the child's head and mother's pelvis are of relative size, the head is presenting and preferably engaged in the pelvis, and the os fully dilated or capable of dilatation.

The *low* application of forceps is used when the child's head is on the pelvic floor.

The *high* application is used when the child's head is above the pelvic floor. For this purpose axis traction must be used.

The line of traction with the obstetric forceps is downward and backward (with axis traction) until the head has reached the pelvic floor, then upward and forward (with handles raised toward pubic bone).

Method of Application.—The patient being properly prepared and under an anesthetic, preferably ether, the bowels and bladder being emptied, the latter by catheter, and the head in vertex anterior position and presentation, introduce the left blade held in the left hand, guided by the right hand, introduced into the vagina to the left side of the mother's pelvis, then the right blade in the operator's

right hand, guided by the left hand, to the right side of the mother's pelvis. The blades must be fitted to the sides of the fetal head and traction made in the line of the birth canal. For other presentations see pages 181 to 184.

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